

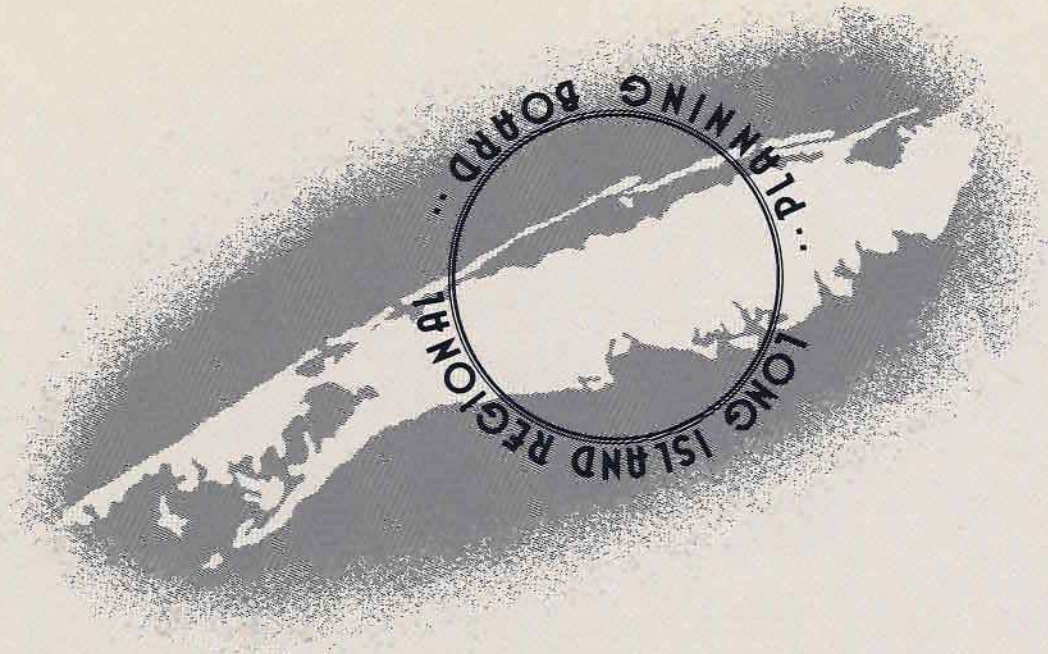
A line drawing illustration of various defense technologies. At the top left is a satellite with a large antenna and solar panels. Below it is a large parabolic radar dish on a tripod stand. In the center is a fighter jet, possibly an F-16, shown from a side profile. In the foreground is a vintage computer system with a CRT monitor, a system unit, and a keyboard.

# **Maximizing the Potential of Long Island's Defense Sector in an Era of Change**

**-1988**

**LONG ISLAND REGIONAL PLANNING BOARD**







**MAXIMIZING THE POTENTIAL OF  
LONG ISLAND'S DEFENSE SECTOR  
IN AN ERA OF CHANGE  
- 1988**







# MAXIMIZING THE POTENTIAL OF LONG ISLAND'S DEFENSE SECTOR IN AN ERA OF CHANGE

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1988

**LONG ISLAND REGIONAL PLANNING BOARD**

This document was prepared by the Long Island Regional Planning Board under a contract with the Office of Economic Adjustment of the U.S. Department of Defense.



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## PREFACE

In August, 1987, the Long Island Regional Planning Board received a Community Planning Assistance grant totaling \$70,000 from the Office of Economic Adjustment of the U.S. Department of Defense. The grant was made in response to the abrupt termination of Fairchild-Republic's T-46A contract and to the prospective contraction of the aerospace industry on Long Island. The purpose of the grant was to analyze the economic significance of Long Island's defense sector and to develop an action plan designed to:

1. Enhance the competitive position of Long Island's remaining aerospace firms so as to preserve the balance between manufacturing and service-producing activity on Long Island;
2. Minimize economic dislocations among displaced aerospace workers; and,
3. Strengthen local economic development programs and mechanisms in order to deal more effectively with current and potential defense cutbacks.

A study of Long Island's aerospace industry was conducted by the staff of the Long Island Regional Planning Board with the assistance of consultants at the C.W. Post Campus of Long Island University and the State University of New York at Stony Brook. The following chapters reflect the results of these efforts.

Chapter 1 provides the economic backdrop. It discusses the strengths and weaknesses of the Long Island economy as of 1987 and analyzes historical patterns of employment growth on Long Island.

Chapter 2 analyzes the configuration of the defense industry on Long Island in terms of defense-related employment and Defense Department prime contract awards to Long Island firms. It also provides an introductory analysis of Long Island's leading defense firms and their current weapons programs.

Chapter 3 analyzes the changing competitive climate within the defense industry. It discusses the impact of recent changes in Pentagon procurement policies on the profitability of the aerospace industry and evaluates recent defense budgets in terms of their likely impact on future Long Island defense production.

Chapter 4 evaluates Long Island's competitive climate for defense production. It analyzes relative wage costs, tax levels, housing costs, worker productivity and energy costs.



Chapter 5 performs a detailed analysis of the current defense contracts and financial status of each of Long Island's major defense firms including Grumman, Hazeltine, Eaton/AIL, Unisys and Harris Corporation.

Chapter 6 analyzes the work being performed by a cross-section of smaller Long Island defense firms.

Chapter 7 analyzes the characteristics of the workforce within major Long Island defense firms. It discusses to what extent the occupations of defense workers are likely to meet the future occupational requirements of Long Island employers and whether the current defense industry skill base can be used to attract non-defense industries.

Chapter 8 evaluates the scope and effectiveness of local economic development efforts.

Chapter 9 discusses the mechanisms whereby second and third-tier defense suppliers are apprised of opportunities to bid for defense work and develops policy suggestions for preserving a viable base of small defense suppliers on Long Island.

Chapter 10 develops an action plan for maximizing the potential of Long Island's defense sector during an era of change.

The Long Island Regional Planning Board is grateful for the assistance of Dr. John E. Lynch of the U.S. Department of Defense. His expertise in dealing with the economic impact of defense cutbacks was extremely helpful throughout the study. The Board also wishes to express its appreciation to the management of the Grumman Corporation, the Government Support Systems Division of the Harris Corporation, the Shipboard and Ground Systems Division of the Unisys Corporation, the Hazeltine Division of the Emerson Electric Company and the AIL Division of the Eaton Corporation for their cooperation in providing personnel data for their respective firms. The Long Island office of Peat Marwick Main and Company provided valuable insights into the new Defense Department procurement regulations and their likely future impact on defense production. Dr. Pearl M. Kerner, the Board's Chief Economist directed the research and wrote the report.

Lee E. Koppelman  
Executive Director



## EXECUTIVE SUMMARY

In August, 1987, the Long Island Regional Planning Board received a Community Planning Assistance grant totaling \$70,000 from the Office of Economic Adjustment of the U.S. Department of Defense. The grant was made in response to the abrupt termination of Fairchild-Republic's T-46A contract. Its purpose was to analyze the economic significance of Long Island's defense sector and to develop an action plan designed to enhance the competitive position of Long Island's remaining aerospace firms and to minimize economic dislocations among displaced aerospace workers. The principal findings of the year-long study are as follows:

**General Economic Conditions on Long Island.** As of calendar year 1987, Long Island's economy remained fundamentally strong. Unemployment rates were at record lows in both counties, construction activity remained brisk and retail sales continued to register real gains. However, there were signs that the Long Island economy was losing steam after five consecutive years of unprecedented growth. Sales of non-durable items, which account for two-thirds of retail sales, were flat, indicating that consumer spending might no longer be a major growth force within the Long Island economy. During 1987, the rate of employment growth also slowed and employment in the defense sector started to contract. Fairchild-Republic closed in 1987 with a loss of 3,300 jobs. Grumman announced a cut of 1,500 jobs in January, 1987 and Eaton's AIL Division announced that it was furloughing 500 workers in August, 1987. In March, 1988, Grumman announced a further reduction of 2,300 workers. In July, 1988, Eaton's AIL Division announced an additional cutback of 500 jobs. During this period, Harris Corporation trimmed its Long Island workforce by some 450 persons. Thus, almost 9,000 Long Island defense jobs were lost during the 1987-88 period.



It is clear that the forces which contributed to Long Island's rapid economic growth during the 1980s -- the massive national defense buildup, the rapid growth of financial and related service jobs in New York City, the migration of back-office jobs to Long Island and the catch up of population-serving jobs to prior population growth on Long Island -- have run their course. Whether or not the Long Island economy can achieve a *soft landing* will depend in large measure on how well Long Island defense firms fare as the Reagan defense buildup winds down and as competition for remaining defense contracts intensifies.

**The Dimensions of the Defense Sector on Long Island.** The size of the defense sector can be measured both in terms of employment and in terms of the dollar value of defense contracts. The Defense Department has identified several industries in which a significant proportion of total output consists of defense production. They include shipbuilding, ordnance, aircraft and radio & TV communications equipment, among others. In the first quarter of 1987, Long Island contained an estimated 71,981 jobs in these defense-related industries. This was equivalent to about 40% of all Long Island manufacturing jobs. Almost 7,500 defense-related manufacturing jobs were generated on Long Island between 1980 and the first quarter of 1987. This was equivalent to almost 58% of the growth of manufacturing employment on Long Island during this period.

In fiscal year 1987, Long Island firms received defense prime contracts valued at almost \$5.3 billion. This was equivalent to 55% of all defense prime contract awards to firms in New York State. During the fiscal 1981-87 period, Long Island firms received defense prime contract awards valued at about \$31.7 billion. Six firms -- Grumman, Unisys, Eaton, Hazeltine, Harris and General Instrument -- accounted for almost 91% of all prime contract awards to Long Island firms during fiscal 1987. Recent events suggest that many of these key players face a difficult transition period as defense spending winds down. This, in turn, could cause problems for Long Island's second and third-tier defense suppliers, many of whom depend on the larger firms for a preponderance of their defense business.

**The Changing Competitive Climate Within the Defense Industry.** The U.S. Government is attempting to reduce and streamline the costs of weapons development and procurement. As a result, Long Island defense firms are being asked to function in a drastically-altered business environment. Contractors must now fund a greater share of initial research and development activities without any guarantee that they will be awarded the follow-on production contract. The Pentagon has adopted a *could cost* approach to introduce competition into sole source situations. Progress payments have been reduced and the Defense Department's profit policy has been revised to attain a reduction in contractor earnings. The repeal of the completed contract method of accounting for taxes as part of the Tax Reform Act of 1986 has deprived defense contractors of a significant source of cash for their operations. The Pentagon is also stressing the concurrent development and production of new weapons systems, which creates additional development risks for the contractor. The foregoing changes have increased the financial risks borne by defense contractors because the size of their up-front investment has increased, the period of time needed to recoup that investment has been extended and their anticipated return has declined. A number of studies have concluded that current earnings in the defense industry do not adequately compensate defense contractors for the risks involved. This imbalance between risk and return could cause the nation's defense industry base to contract. The current defense scandal is likely to exacerbate the problem. It could prevent the Defense Department from modifying some of its more onerous and unrealistic procurement policies. At worst, it could result in even stricter Pentagon controls over the defense industry.

Tighter defense budgets will also affect the competitive climate within the defense industry. Real increases in defense spending peaked in fiscal year 1985 and have since tapered off. Real spending declines are expected in fiscal 1988 and 1989 and only slight increases in real defense spending are anticipated for the fiscal 1990-93 period. Slowly-growing defense expenditures coupled with relatively stringent procurement regulations are likely to depress defense industry profits on Long Island and nationally.



**Long Island's Competitive Climate for Defense Production.** One of Long Island's major competitive assets is its stock of human capital. The skills of the resident labor force are a critical variable because much of Long Island's economic base is predicated on *thoughtware* activities that require a sophisticated level of technical expertise. The relative cost of labor has also become more important given the current Defense Department emphasis on cost containment. A Long Island wage survey performed in August, 1987 by the U.S. Bureau of Labor Statistics indicates that bi-county wages for a broad spectrum of professional, technical, clerical and skilled and unskilled blue-collar occupations are in line with comparable wage costs in other metropolitan areas, including those located in the sunbelt. However, bi-county wages have begun to rise more rapidly than wages in competing metropolitan areas. This reflects Long Island's relatively tight labor market for selected occupations. If this continues, Long Island's competitive position in terms of wage costs will deteriorate.

Long Island is at a relatively severe competitive disadvantage for defense work by virtue of its disproportionately high housing costs. The juxtaposition between wages and housing costs suggests that many of the occupational groups vital to Long Island's defense industry can no longer afford to live here. In August, 1987, a computer programmer who purchased a median-priced ~~used~~ home in Nassau County would have needed more than 61% of his or her annual salary just to amortize the mortgage. An electronics technician would have needed more than 85% of annual salary to amortize the mortgage on a median-priced Nassau home and more than 69% of annual salary for the median-priced Suffolk home.

Long Island is also a high-tax area. Although it does not have an energy-intensive manufacturing base, the energy costs of Long Island's defense industries are at the high end of the spectrum relative to the energy bill for defense industries located in other parts of the nation. The recent agreement between LILCO and New York State to dismantle the Shoreham Nuclear Power Station allows LILCO to recover \$3.6 billion of Shoreham's cost from its customers over a period of forty years. This will result in further rate increases.

Some of these competitive disadvantages could be offset by unusually strong worker productivity. An analysis of value added per dollar of production worker wages indicates that the productivity of Long Island's defense workers is relatively high. In New York State's aircraft industry, most of which is located on Long Island, the ratio of value added to wages was \$4.78 as compared with \$4.34 in California and \$4.35 in Texas. Nevertheless, even higher worker productivity is needed to offset Long Island's high housing costs, energy costs and taxes. One means of boosting productivity is to increase the level of capital spending per worker. However, Long Island defense firms may find themselves in a catch-22 situation with respect to investment capital. The new DOD procurement regulations will make it more difficult to generate investment capital internally. At the same time, the growing imbalance between risks and returns in the defense industry is likely to discourage the financial community from making long-term investments in the defense sector.

**The Status of Long Island's Leading Defense Firms.** The Grumman Corporation is Long Island's largest defense employer. The Company maintains extensive out-of-state facilities and has announced that many future growth activities will be located off Long Island because of the high cost of doing business here. Grumman recently lost the competition to build the Navy's next generation attack plane, the Advanced Tactical Aircraft. However, there is a possibility that revelations emanating from the current defense scandal will prompt reopening of the bidding process for the ATA. Grumman currently produces the F-14 Tomcat, the EA-6B Prowler, the A-6 Intruder, the C-2 Greyhound and the E2C Hawkeye. The E2C is being upgraded. Grumman is also upgrading the F-14. However, the Defense Resources Board recently recommended that funding for any new EA-6Bs be ended in 1990. Grumman's A-6 program is now scheduled to extend through 1991 and unexpected problems associated with development of the ATA could push A-6 production well into the 1990s. The final C-2 Greyhounds are to be built in 1989. Grumman's ability to sustain production of its existing aircraft, to act as a subcontractor to other aircraft manufacturers and to successfully market its military aircraft abroad will determine to what extent Grumman can maintain its aircraft manufacturing capability on Long Island.



Grumman's ability to diversify into new defense and non-defense areas will also be critical. Diversification is already occurring. Grumman is moving forcefully into systems integration. In 1987, it won an \$841 million contract to help NASA manage development of the manned space station. Grumman's other major systems integration assignment is to develop Joint STARS, a flying command post capable of managing an entire battlefield. Grumman has also moved decisively into the market for special purpose vehicles with a \$1.1 billion contract with the U.S. Postal Service to build 99,150 delivery trucks by 1993. Thus, Grumman is diversifying away from the airframe business, its traditional mainstay, and is moving into electronics, systems integration, special purpose vehicles and information services.

The Grumman Corporation has been characterized by the growing use of debt. Its long-term debt increased from \$76 million in 1983 to a \$643 million in 1987. Analysts attribute the increase to the need to finance growth in new areas such as electronics and special purpose vehicles. It is expected that as these programs go into production, the level of debt will stabilize and decline.

Harris Corporation is a Florida-based Company. Its Government Support Systems Division, the largest of its twenty-one units in terms of sales and employees, is headquartered in Syosset. It employs some 2,000 workers on Long Island and is a leader in the automatic test equipment field. Harris is developing an automatic depot inertial navigation system designed to test aircraft navigational systems. It is also developing test-program sets for the Air Force's B-1B bomber and the Integrated Diagnostic Support System, which will allow engineers to design self-diagnostic capabilities into avionics and electronics systems while they are still on the drawing boards. The Division's primary work, the ATS(V)1, ATS(V)2 and Hybrid test system, is slated to end in 1989. Harris has launched a major effort to reduce costs and expenses. Therefore, it is conceivable that some of the Division's manufacturing operations will be shifted to its lower-cost Florida facilities as competition in the market for automatic test equipment intensifies.

Unisys was formed by the merger of the Sperry Corporation and the Burroughs Corporation. The former Sperry operation on Long Island is now called the Shipboard and Ground Systems Division.

There are some 4,900 employees at the Great Neck headquarters of the Division and at a testing, simulation and training center in Ronkonkoma. The Shipboard Group accounts for about 10% of Unisys's overall revenues. Their existing contracts represent one-third of Unisys's defense dollars. The Division is currently designing and building navigational subsystems for the Navy's Trident II submarine. The Division also provides fire control systems for the Navy's Perry Class of frigate ships. The Division is designing electronics and combat systems for Canadian patrol frigate ships, integrating combat systems for Navy ships and designing automated test systems for the Air Force. The Shipboard Group is also working on a contract to build three prototypes of the North Warning System, a short-range radar system, and will be working on NEXRAD, the next generation weather radar system to be used by the National Weather Service.

The Shipboard Division's work is long-term in nature and is concentrated in areas that are not likely to be vulnerable to cuts by Congress or the Pentagon. However, the Division is heavily dependent on Navy funding and its operations will be affected by future Navy funding levels. The Division's operations will also be affected by management decisions within the Corporation. Unisys could conceivably sell off part or all of its Long Island defense operations to raise cash in its competitive battle with IBM. It could also move some of these operations off Long Island to its lower-cost, non-unionized facilities.

In December, 1986, Long Island's Hazeltine Corporation was purchased by the Emerson Electric Company of St. Louis. Hazeltine employs some 2,100 workers on Long Island. Hazeltine is currently building 178 Microwave Landing Systems for the Federal Aviation Administration under a \$90.6 million contract it won in 1983. However, the project is two years behind schedule and significantly over budget and the General Accounting Office has recommended that no new funding be appropriated for the program. Hazeltine's destiny is no longer solely in its own hands. Emerson regards Hazeltine as a good strategic fit with its own government and defense business. The long-term outlook for the company will depend on how fully it meets Emerson's expectations in terms of product quality, customer satisfaction and profitability.



Eaton Corporation, a Cleveland, Ohio manufacturer, produces truck power train components, hydraulic products, automotive and appliance controls and consumer appliances. Eaton plans to sell its seven defense divisions. They include AIL in Deer Park, the Command Systems Division in Farmingdale and five west coast units. In 1981, AIL won a \$3.5 billion contract to build the ALQ-161 defensive avionics system for the B-1B bomber. It built 100 ALQ-161 units and completed delivery in 1987. The completion of the troubled B-1B program means that AIL will no longer be a \$1 billion division. AIL has also encountered problems with its \$81.5 billion contract to develop a new jamming system for the EF-111A jet aircraft. In June, 1988, the Air Force claimed that AIL had defaulted on the contract and asked for repayment of \$39 million in progress payments. Recent management and image problems may make it difficult for Eaton to find a buyer for AIL and its other defense operations. In July, 1988, AIL announced that it was trimming an additional 500 jobs from its 4,700 member workforce. The future of AIL and its remaining employees is highly uncertain.

The foregoing analysis suggests that Long Island's leading defense firms are in the throes of a transition that could result in the significant contraction of defense-related employment on Long Island.

#### **The Characteristics of Long Island's Defense Industry Workforce.**

The occupational distribution of workers within Long Island's major defense firms was considerably different from that of the resident labor force as a whole. Approximately 37% of the defense industry workers were professionals, primarily engineers. Fewer than 16% of those within Long Island's resident labor force were professionals. Technicians accounted for 12.6% of the defense industry labor force but comprised only 1.8% of the total resident labor force. Factory assemblers were also more highly represented in the defense industry labor force than in the general resident labor force. This confirms the fact that the defense industry is a major source of factory jobs on Long Island.

The analysis indicates that the Long Island economy can readily absorb even a 30% contraction of the current workforce within its major defense firms -- Grumman, Unisys, Harris, Hazeltine and

Eaton/AIL -- over the next decade. One explanation is that a significant segment of the workforce at these firms is approaching retirement. Some 35% of the managers in the defense firms surveyed were over age 55 as were 25% of the engineers, 23% of the electrical technicians, 31% of the drafters, almost 26% of the skilled craftspersons and almost 23% of the assemblers. In addition, Long Island's manufacturing sector is expected to continue to grow, albeit slowly, and this will generate jobs for some displaced defense industry workers. However, blue-collar workers will face an increasingly difficult employment situation on Long Island if air-frame production contracts as expected.

The findings also suggest that Long Island's major defense firms are a repository of skilled engineering and technical talent. The availability of such skilled workers is a major competitive advantage in Long Island's quest to attract high-technology enterprises in non-defense areas.

**The Scope and Effectiveness of Economic Development Efforts on Long Island.** Long Island is characterized by a rich network of public and private-sector economic development agencies and groups. The commitment to economic development by several levels of government, by local chambers of commerce and by a plethora of *action* groups leads to the perception that there is a duplication of services in terms of advertising, business loans and other business development activities. In reality, each of these organizations and agencies fills a specific need and the various economic development efforts complement each other. The current configuration of economic development activities on Long Island exemplifies a *network* approach that is more effective in attracting and retaining business than the *lone wolf* approach.

There is, nevertheless, room for improvement. Better financing mechanisms are needed. IDA financing has been greatly reduced by the Tax Reform Act of 1986 and alternate financing mechanisms are needed. Another problem is that many towns and school districts have opted out of the 485B tax abatement program. This program gives new businesses a 50% reduction in local property taxes during their first year of existence, with the reduction diminishing by 5% in each subsequent year.



A number of economic development officials have also suggested the need for a more comprehensive economic data base, a more effective marketing strategy, retraining programs that focus on the actual needs of employers, and a greatly expanded supply of affordable housing. They also underscore the need to educate the public concerning how business helps to create tax rates and thereby hold down property taxes. Economic development officials appear to believe that the constant tug-of-war between business advocates and those who oppose growth has begun to damage the business climate on Long Island. These officials also suggest that the overregulation of commerce and industry, as exemplified by a recent Suffolk County law regulating the use of video display terminals, is poisoning the business climate.

**Maintaining a Viable Base of Second and Third-Tier Defense Suppliers.** Long Island's smaller defense firms represent a valuable resource. Many of these firms are characterized by uncertain business prospects because of inadequate capital for plant and equipment; inadequate working capital; inadequate technical expertise; an inappropriate product mix vis-a-vis the needs of the prime contractors; lack of appropriate business contacts; and, inadequate knowledge about how to do business directly with the Defense Department. They have also been harmed by perverse Defense Department policies.

The lack of adequate capitalization means that there are some areas of technology in which small firms can't compete. Long Island currently appears to have an adequate base of contractors for machining and sheet metal work. However, local prime contractors must go to Canada, the midwest, Route 128 around Boston and the west coast for microwave sources and printed circuit boards. Microwave components require sophisticated test equipment so that the industry is relatively capital intensive. To help assure a more adequate supply of capital for Long Island's second and third-tier defense suppliers, the ceiling on S.B.A.-guaranteed loans should be raised to a more realistic level. The DOD could also assist contractors in raising investment capital through indemnification.

With the volume of knowledge required by new defense programs increasing exponentially, it is also necessary to enhance the technical expertise of Long Island's second and third-tier defense suppliers. A better exchange of technical information between prime contractors and subcontractors is one vehicle for doing so.

Such exchanges could occur at technical symposiums sponsored by Long Island's large prime contractors and in university settings.

There is also an urgent need to bring Long Island's smaller defense suppliers into contact with prime contractors throughout the nation and directly with Department of Defense buying activities. The Procurement Assistance Unit of the New York State Department of Economic Development is already doing useful work in this area. An even greater effort would appear to be warranted. Regular Long Island trade fairs to which major *primes* throughout the nation are invited are one possibility. Trips that bring Long Island subcontractors to defense industry trade fairs in other states are another possibility. Joint sponsorship and financing of these trips by the New York State Department of Economic Development and the U.S. Defense Department should be considered. Canada currently uses its Defense and Commerce Departments jointly to promote such trade fairs.

Long Island's smaller defense suppliers also need counseling on how to do business with the Defense Department. Some don't understand what's involved in the bidding process or how the payments process works. They require help in filling out the forms needed to get on a bidders list and in sending them to the appropriate buying activity. Some defense suppliers need help in bid and proposal preparation and in understanding post-award requirements.

The fact that the government applies uniform rules to both prime contractors and subcontractors has also caused a number of problems. That is, the government fails to recognize that there are significant qualitative differences in structure, conduct and performance between smaller subcontractors and large prime contractors. Defense Department policies have actually reinforced the shrinkage of the lower-tier supplier base by creating obstacles to entry. These obstacles include unduly specialized military specifications, lengthy gestation periods, low profit margins and uncertainty about continued project funding. The growing Defense Department emphasis on competition could also help to destroy Long Island's base of small defense suppliers. As the profits of the area's prime contractors are squeezed, they may be forced to subcontract to firms in low-cost areas such as the Caribbean. This would take jobs away from Long Island.



At present, there do not appear to be sufficient financial incentives for Long Island's prime contractors to train and nurture small defense suppliers. Under Public Law 99-661, government agencies are allowed to pay a premium to small disadvantaged suppliers. The nation's prime contractors should also be allowed to do so.

The failure to nurture second and third-tier defense suppliers on Long Island and nationally could lead to the shrinkage of suppliers at the subcontractor level. This could cause industrial bottlenecks that impair the nation's defense preparedness.

**An Action Plan for Continued Economic Growth.** Long Island's defense sector is entering a period of change that is likely to transform the industry and dramatically alter its role in the Long Island economy. A number of actions are needed to stabilize the defense industry on Long Island and to mitigate the impact of the anticipated downturn in defense spending.

- 1. Defense Department procurement policies should be modified.** The once cooperative relationship between the Pentagon and its defense suppliers has degenerated into an adversarial relationship that could lead to deterioration of the defense industry base. Congress and the Defense Department should clearly define national security and industrial base requirements and test existing procurement policies and projected policy changes against these requirements. The Defense Department should also provide additional incentives for contractor investment in research and development, physical facilities and human resources. If the basic risk-return equation for defense contractors remains unbalanced, Long Island's defense industry cannot thrive.
- 2. Given expected real declines in defense spending, Long Island must fully exploit its other resources, including the potential for high value-added technological activities.** Long Island, with its unique educational facilities and technically-trained manpower, is well positioned to be at the forefront of developments

in semi-conductors and integrated circuits, micro-processors, computersoftware, electronic information and communications systems, genetic engineering, fiber optics and medical diagnostic equipment. The key elements in Long Island's high-technology infrastructure are the Brookhaven National Laboratory, the Cold Spring Harbor Laboratory, the Center for Biotechnology at SUNY, Stony Brook, the planned high-technology incubator at SUNY, Stony Brook, the availability of advanced university training in the scientific and technical disciplines and the availability of venture capital.

- 3. Long Island should adopt strategies that improve the business climate for small businesses, particularly small manufacturing businesses.** The Long Island economy is a small business economy. Approximately 80% of all bi-county establishments employ fewer than ten workers. Long Island might usefully draw on the experiences of the Emilia-Romagna region of Italy, which successfully nurtured small manufacturing firms. Small firms in the region were provided with a broad spectrum of centralized business services through close cooperation between the regional government and business and labor groups. CNA, the largest small firm association in the area, handles general accounting for 44,000 of its member firms and prepares payrolls for another 16,000 firms. CNA also organizes technical and management courses through its regional training centers, represents member firms at trade fairs and exhibitions and helps establish cooperatives to deal with bulk purchasing, product and process design, marketing and pollution control. A public-private partnership created by the regional government with the support of banks and industrial associations, has created a network of industry-specific service centers that introduce new technologies and management methods to small businesses. Local universities also help to support businesses in the area. For example, the University of Bologna has a ceramics center that performs applied research on materials. It helped to nurture the development of the ceramic tile industry in the area.



Long Island can utilize the experiences of the Emilia-Romagna region to enhance the competitiveness of its small manufacturing firms. In order to prosper, small firms, particularly those that utilize evolving technologies, need a broad spectrum of low-cost financial, technical and managerial services. The centralized services provided by CNA seem particularly applicable to the needs of Long Island's emerging high technology firms. Industry-specific service centers targeted to Long Island's high-technology growth industries, such as bioengineering, should also be considered.

- 4. Long Island should develop more effective business-education partnerships.** A high quality primary and secondary educational system is needed to remain competitive in a technological world. Long Island has some of the finest systems of primary and secondary education in the nation. However, if Long Island firms are to continue to compete successfully in national and international markets, they must align themselves more closely with the local schools that are training their future workforce. Educators can respond most effectively to the changing knowledge requirements of the workplace if the business community is actively involved with local schools. For example, a closer dialogue between Long Island high technology firms and local high school math and science teachers and students could be the catalyst for developing more relevant math and science curriculums and for arousing student interest in the scientific disciplines. It is also necessary to emphasize the study of foreign languages in the early grades. Greater familiarity with foreign languages will become increasingly necessary as the U.S. economy becomes more closely integrated with the global economy.

There are also numerous opportunities for closer industry-university cooperation on Long Island. Joint university-industry research partnerships are one possibility. Entrepreneurship courses that provide *hands*

*on* instruction on how to start a business and write a business plan are also useful. Long Island universities can provide an *idea bank* data base containing rosters of student and faculty scientists and engineers, their research projects and their employment interests. The universities might consider establishing high-technology advisory panels composed of university administrators, executives of high technology firms and venture capitalists. The panels could address such matters as continuing education programs, joint research and development projects, industry donations of funds and equipment to the university and guidelines for faculty consulting and entrepreneurship. Such panels would be a signal to university faculty members that the university is serious about cooperating with industry and that faculty members will be recognized for their practical problem-solving efforts as well as for publishing in scholarly journals.

Closer industry-university cooperation would assure a better *match* between the skills supplied and demanded within the Long Island labor market. It could also lead to more rapid commercialization of the new ideas and techniques being generated within Long Island's university community.

- 5. Well-planned outplacement and training programs are needed to mitigate the economic plight of displaced defense workers.** A number of effective outplacement programs currently exist on Long Island. For example, the Suffolk County Labor Department has worked closely with labor and management at the Fairchild Republic Company to assist employees affected by the closure of the firm's Farmingdale facility. Their model is also applicable to situations involving more limited layoffs. The Department has helped to sponsor several job fairs and is currently administering a Job Training Partnership Act special re-employment assistance grant totaling \$1 million. Services provided under the grant include on-the-job training, relocation financial assistance, classroom re-training, employability workshops, assessment and counseling. Several major Long Island defense firms also provide effective outplacement programs for their displaced workers.



Long Island is also richly endowed with the educational resources needed to retrain displaced aerospace workers. There are currently thirty degree-granting post-secondary institutions on forty-four campuses in Nassau-Suffolk. Many have on-going programs of vocational, technical and continuing education. Hofstra's College for Continuing Education has an Office of Corporate Training that provides courses designed to upgrade employee skills. SUNY/Stony Brook's Center for Continuing Education offers courses in labor-management studies, industrial management, public affairs, health care administration, computer science and environmental studies. The New York Institute of Technology offers certificate programs in culinary arts, paralegal studies, interior design, travel and tourism, fashion retailing and merchandising and real estate. C.W. Post's Office of Continuing Education offers certificate programs in accounting, paralegal studies, art and antiques, interior design, real estate, security administration, alcoholism counseling, insurance, mainframe programming, word processing, travel and tourism. A number of relevant courses are also offered at Nassau and Suffolk high schools, often through BOCES. Courses are given in electronics and related fields, auto mechanics and auto repair, small engine and appliance repair, drafting and the printing trades, and computer applications.

## CONCLUSIONS

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It has become clear that the Long Island economy will be required to adjust to some shrinkage in its defense industry in the immediate future. Long Island already possesses many of the resources needed to successfully adjust to the cutbacks. The myriad of existing governmental, quasi-governmental and private sector economic development and *action* groups can be harnessed to lobby for additional defense contracts and to promote the growth of new businesses, particularly in the high-technology area. It should be recognized, however, that government-imposed regulations which raise the cost of doing business on Long Island or are perceived by the business community as overly restrictive can nullify even the most effective economic development efforts.

This study has attempted to answer the question: *How can Long best prepare for the modest shrinkage of its defense industry base?* The underlying premise is that Long Island's defense sector remains economically viable and that Long Island defense firms will continue to make a significant contribution to the nation's defense preparedness. Some have suggested that a more relevant question is: *How can Long Island best convert to non-defense production?* The implication is that Long Island's defense base should be allowed to atrophy and that non-defense production is, on the whole, more economically desirable than defense-driven manufacturing activity.

A number of studies have shown that economic conversion doesn't work. Conversion implies a movement into new product areas. The industrial plant reuse process requires five or more years for product development, market analyses, plant engineering, new tooling and workforce retraining. Nor is there any guarantee that the new jobs will pay as much as the defense jobs that they replaced.

Long Island still possesses unique competitive advantages for defense production in terms of the skills of its current defense industry workforce, the existing investment in defense plant and equipment and the energy of its local community and business leadership. **These resources should not be squandered.**



# CHAPTER 1...

## THE STATUS OF THE LONG ISLAND ECONOMY

### CURRENT ECONOMIC INDICATORS

An analysis of economic indicators for calendar year 1987 suggests that the Long Island economy remains fundamentally strong. December, 1987 unemployment rates -- 2.3% in Nassau and 3.0% in Suffolk -- were at record lows in both counties. Long Island gained some 24,000 new jobs during 1987. This followed on the heels of a gain of 38,000 jobs in both 1985 and 1986 and a gain of almost 52,000 jobs in 1984. There were some emerging weaknesses, however. In 1987, manufacturing employment declined by 4,900 jobs as a result of the loss of 6,000 durable manufacturing jobs. On Long Island, durable manufacturing jobs are generally defense-related jobs. The loss of 6,000 jobs reflects the closing of Fairchild-Republic, which idled 3,500 workers, as well as scattered layoffs in other major defense firms.

**Table 1.1**  
**Unemployment Rates\*, December 1985, 1986 and 1987**  
**Nassau-Suffolk, New York State, United States**

Area	Dec. 1985	Dec. 1986	Dec. 1987
Nassau	3.6%	3.2%	2.3%
Suffolk	4.2	4.0	3.0
Nassau-Suffolk	3.9	3.6	2.7
New York State	5.9	5.4	4.2
United States	6.7	6.3	5.4

\*Not Seasonally Adjusted

Source: New York State Labor Dept.

In recent years, construction activity on Long Island has also been relatively brisk. A total of 10,127 new residential dwelling units were authorized by permit on Long Island during 1987. This was only slightly below the record 11,755 units authorized in 1986. The value of new non-residential construction exceeded \$406 million in 1987. This represents an increase of almost 20% over the dollar value of non-residential construction during 1986 and is equivalent to a real increase of 15% after adjusting for inflation.



**Table 1.2**  
**Employment, By Industry, Nassau-Suffolk**  
**December, 1985, 1986 and 1987**

Industry	-(000) Jobs-			-Net Change-	
	Dec. 1985	Dec. 1986	Dec. 1987	Dec. 1985-86	Dec. 1986-87
Manufacturing	180.4	181.7	176.8	+1.3	-4.9
Durables	130.1	129.2	123.2	-0.9	-6.0
Non-Durables	50.3	52.5	53.6	+2.2	+1.1
Non-Manufacturing	917.1	954.5	983.6	+37.4	+29.1
Construction	52.8	57.7	63.6	+4.9	+5.9
Transportation, Utilities	46.9	48.3	49.4	+1.4	+1.1
Trade	305.2	313.7	319.0	+8.5	+5.3
Wholesale	80.8	83.3	85.8	+2.5	+2.5
Retail	224.4	230.4	233.2	+6.0	+2.8
Finance, Insurance, Real Estate	67.4	73.6	76.8	+6.2	+3.2
Services*	265.7	279.5	288.0	+13.8	+8.5
Government	179.1	181.7	186.8	+2.6	+5.1
<b>Total Non-Farm Employment</b>	<b>1097.5</b>	<b>1136.2</b>	<b>1160.4</b>	<b>+38.7</b>	<b>+24.2</b>

\*Includes Mining

Source: New York State Labor Dept.

**Table 1.3**  
**Number of Residential Dwelling Units Authorized by Permit**  
**on Long Island, by Type of Unit, 1985, 1986, 1987**

Type of Unit	1985	1986	1987	1986		1987	
				Nassau	Suffolk	Nassau	Suffolk
One-Family	8,056	9,043	8,822	1,774	7,269	1,526	7,296
Two-Family	150	570	194	114	456	116	78
3/4 Family	22	22	69	8	14	0	69
5 Family	733	2,120	1,042	592	1,528	456	586
<b>Total</b>	<b>8,961</b>	<b>11,755</b>	<b>10,127</b>	<b>2,488</b>	<b>9,267</b>	<b>2,098</b>	<b>8,029</b>

Source: U.S. Bureau of the Census



**Table 1.4**  
**Value of Non-Residential Construction on Long Island,**  
**1985, 1986, 1987 (\$000)**

	1985	1986	1987
Nassau	98,013	92,748	145,110
Suffolk	190,904	246,664	261,584
Total	288,917	339,412	406,694
% change	+10.6	+17.5	+19.8
Rate of Inflation	+3.7	+3.3	+5.0

Source: U.S. Bureau of the Census

Long Island retail sales for 1987 were 7.4% ahead of sales during 1986. Given the 1987 inflation rate of 5% in the New York Metropolitan Region, this was equivalent to a real increase of about 2%. The 1987 sales gain followed a 6.8% sales increase during 1986. However, retail sales on Long Island have become somewhat unbalanced. Sales of major durable items such as cars, furniture and appliances were unusually strong during 1987, running 23% ahead of year-ago levels. However, non-durables sales, which account for two-thirds of total retail sales, were flat. The robust pace of durables sales reflected strong car purchases as well as an upturn in sales of furniture and appliances in response to the stronger pace of residential construction on Long Island in recent years. However, several back-to-back years of strong sales may have led to market saturation. This means that Long Island could experience several years of relatively stagnant durables sales. With non-durables sales already flat, this could mean that consumer spending would no longer be a major growth force within the Long Island economy.

**Table 1.5**  
**Retail Sales, by Type, Nassau-Suffolk**  
**1985, 1986, 1987**  
**(\$ Millions)**

	1985	1986	1987	% Change	
				1985-86	1986-87
Total Sales	\$19,864	\$21,224	\$22,796	+6.8	+ 7.4
Durables	6,395	7,025	8,613	+9.9	+22.6
Non-Durables	13,469	14,199	14,183	+5.4	- 0.1

Source: U.S. Commerce Department

The buoyancy of the Long Island economy during 1987 was reflected in its Index of Business Activity, which incorporates measures of retail sales, construction activity and employment growth. On Long Island, the average index for 1987 stood at 152 on a 1977 base of 100, indicating that Long Island had the second fastest-growing economy in the state during the 1977-87 period.

**Table 1.6**  
**Index of Business Activity, 1987**  
**Nassau-Suffolk vs. Selected Labor Market Areas**  
**(1977=100)**

	Average Annual Index, 1987
<b>NASSAU-SUFFOLK</b>	<b>152</b>
New York City	118
Westchester-Rockland-Putnam	142
Albany-Schenectady-Troy	129
Binghamton	133
Buffalo	113
Poughkeepsie	154
Rochester	132
Syracuse	131
Utica-Rome	121
New York State	127

Source: New York State Commerce Dept.

## THE ECONOMIC OUTLOOK

The Long Island economy appears to be moving toward a slower growth path. Long Island's rapid economic growth during the 1980s was caused by the confluence of the following factors:

1. The impact of the massive national defense buildup;
2. The beneficial effects on commuter incomes of the rapid growth of financial service jobs and related services in New York City;
3. The migration of back office jobs to Long Island; and,
4. The catch-up of population-serving jobs to prior population growth on Long Island, particularly in Suffolk County.



Many of these factors have already run their course or will have a negative impact on future economic growth. For example, the explosion in service jobs on Long Island in response to prior population growth has already largely occurred. The shakeout in financial services currently in progress in New York City is likely to adversely affect commuter incomes. There is also the possibility of a national recession sometime in 1989. However, the most immediate threat to the Long Island economy is the erosion of its defense industry. During the past decade, employment growth on Long Island was concentrated in the service-producing industries. As a result, service-producing jobs accounted for an estimated 80% of total bi-county employment as of December, 1987. The proliferation of service-producing jobs has tended to obscure the importance of Long Island's manufacturing sector, which is dominated by defense firms. Many of the new service jobs are low-wage, part-time or temporary jobs and cannot support a primary wage earner on Long Island. By contrast, Long Island's defense-dependent manufacturing sector pays relatively high wages. The following section analyzes the importance of manufacturing activity on Long Island not only in terms of employment but also in terms of wages.

## HISTORICAL EMPLOYMENT TRENDS

### The Shift to Services, The Importance of Manufacturing

The shift toward a service-producing economic base, both on Long Island and nationally, has accelerated in recent years. An analysis of employment growth on Long Island, by industry, during the 1975-85 decade clearly demonstrates the growing importance of service-producing jobs. Of some 130,500 private-sector jobs created in Nassau County between 1975 and 1985, 97.6% were in one of the service producing industries -- transportation, utilities, wholesale and retail trade, finance, insurance and real estate and services. Of some 154,500 private-sector jobs created in Suffolk, 67.3% were in one of these industries. The shift to a service-based economy was less pronounced in Suffolk where the growth of manufacturing jobs was responsible for more than 24% of overall private-sector job growth.

**Table 1.7**  
**Private-Sector Employment Growth, by Industry\*, 1975-85**  
**Nassau and Suffolk Counties**  
**(No. of Jobs)**

Industry	-NASSAU-				-SUFFOLK-			
	1975	1985	Net Change	% of Total Growth	1975	1985	Net Change	% of Total Growth
Agriculture, Forestry, Fisheries	1,858	3,040	+1,182	0.9	1,080	2,305	+1,225	0.8
Mining	209	275	+66	**	135	174	+39	**
Contract Construction	22,137	21,475	-662	-0.5	10,702	22,510	+11,808	7.6
Manufacturing	91,182	93,731	+2,549	2.0	58,899	96,438	+37,539	24.3
Transportation, Utilities	23,060	27,996	+4,936	3.8	12,374	20,180	+7,806	5.1
Wholesale Trade	35,954	48,468	+12,514	9.6	16,244	33,507	+17,263	11.2
Retail Trade	92,445	116,817	+24,372	18.7	59,594	83,358	+23,764	15.4
Finance, Insurance, Real Estate	31,383	50,624	+19,241	14.7	14,213	19,417	+5,204	3.4
Services	105,763	172,099	+66,336	50.8	47,178	97,062	+49,884	32.2
<b>Total</b>	<b>403,991</b>	<b>534,525</b>	<b>+130,534</b>	<b>100.0</b>	<b>220,419</b>	<b>374,951</b>	<b>+154,532</b>	<b>100.0</b>

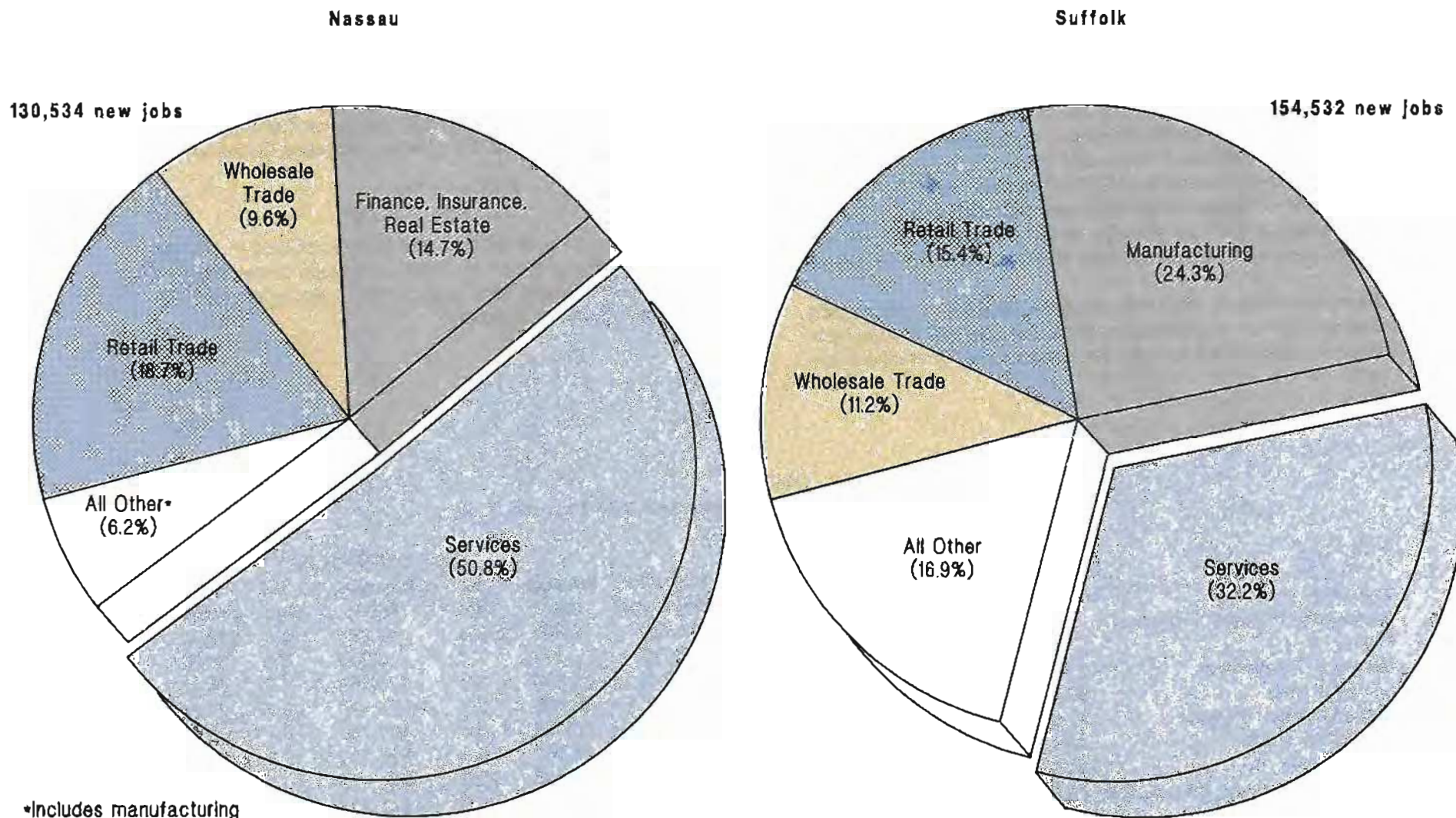
\*Excludes government employees, railroad employees, self-employed persons, non-classifiable establishments.

\*\*Less than 0.05%

Source: U.S. Bureau of the Census



**Figure 1.1**  
**INDUSTRY SHARE OF PRIVATE-SECTOR EMPLOYMENT GROWTH, 1975-85**  
**THE NASSAU-SUFFOLK LABOR MARKET**  
**(Percents)**



Source: U.S. Bureau of the Census



The growing prevalence of service-producing jobs nevertheless masks the economic importance of the manufacturing sector on Long Island. Table 1.7 has been recast to demonstrate the percent distribution of employment and the percent distribution of payrolls, by industry. In Nassau County, manufacturing accounted for only 17.5% of total private sector employment but for 23.4% of private-sector payrolls. In Suffolk, manufacturing jobs accounted for 25.7% of total jobs but for 29.7% of total payrolls. These differences reflect the fact that manufacturing pays more than many of the service industries. In Nassau, the average payroll per employee in manufacturing was \$26,041 during 1985; the average payroll per employee in services was only \$17,445. In Suffolk, manufacturers paid an average of \$21,387 per employee; the service industries paid an average of only \$16,639 per employee.

Given the relatively high salaries associated with Long Island's defense-oriented manufacturing base, the prospect of fewer employment opportunities in the defense industry is of immediate concern.

## HISTORICAL EMPLOYMENT TRENDS

### The Importance of Small Business

Much of the recent employment growth on Long Island was generated by small businesses, those employing fewer than ten workers. Some of these firms could be severely impacted by the loss of defense business.

In 1985, some 64% of all business establishments in Nassau County and 62% of those in Suffolk employed fewer than five workers. Approximately 80% of all bi-county establishments employed fewer than ten workers.

**Table 1.8**  
**Long Island Industries Ranked by Employment and Payrolls, 1985**

Industry	-NASSAU-					-SUFFOLK-				
	Employ- ment	% Dist.	Payrolls (\$000)	% Dist.	Payrolls/ Employee	Employ- ment	% Dist.	Payrolls (\$000)	% Dist.	Payrolls/ Employee
Agriculture, Forestry, Fisheries	3,040	0.6	47,514	0.5	\$15,630	2,305	0.6	42,774	0.6	\$18,557
Mining	275	0.1	6,261	0.1	22,767	174	*	5,288	0.1	30,391
Contract Construction	21,475	4.0	561,392	5.4	26,142	22,510	6.0	525,264	7.6	23,335
Manufacturing	93,731	17.5	2,440,826	23.4	26,041	96,438	25.7	2,062,549	29.7	21,387
Transportation, Utilities	27,996	5.2	649,749	6.2	23,209	20,180	5.4	467,706	6.7	23,177
Wholesale Trade	48,468	9.1	1,228,220	11.8	25,341	33,507	8.9	825,166	11.9	24,627
Retail Trade	116,817	21.9	1,399,589	13.4	11,981	83,358	22.3	974,127	14.0	11,686
Finance, Insurance, Real Estate	50,624	9.5	1,102,624	10.5	21,781	19,417	5.2	421,531	6.1	21,709
Services	172,099	32.1	3,002,190	28.7	17,445	97,062	25.9	1,615,050	23.3	16,639
<b>Total</b>	<b>534,525</b>	<b>100.0</b>	<b>10,438,365</b>	<b>100.0</b>	<b>19,528</b>	<b>374,951</b>	<b>100.0</b>	<b>6,939,455</b>	<b>100.0</b>	<b>18,508</b>

\* Less than 0.05%

Source: Long Island Regional Planning Board based on data from the U.S. Bureau of the Census



**Table 1.9**  
**Number of Establishments by Employment Size Class, 1985**  
**Nassau and Suffolk Counties**

Size Class	<b>-NASSAU-</b>		<b>-SUFFOLK-</b>	
	No.	% Distribution	No.	% Distribution
1-4	29,004	63.7	21,100	62.2
5-9	7,737	17.0	6,027	17.8
10-19	4,349	9.6	3,402	10.0
20-49	2,751	6.0	2,152	6.3
50-99	950	2.1	711	2.1
100 or more	726	1.6	520	1.6
<b>Total</b>	<b>45,517</b>	<b>100.0</b>	<b>33,912</b>	<b>100.0</b>

Source: U.S. Department of Commerce, Bureau of the Census

An examination of Long Island's leading growth industries underscores the importance of small business to the Long Island economy. During the 1975-85 period, the leading growth industries were as follows:

- business services, +39,955 jobs;
- health services, +26,235 jobs;
- wholesale trade, durables, +19,140 jobs;
- eating and drinking places, +17,211 jobs;
- electric and electronic equipment, +17,193 jobs;
- wholesale trade, non-durables, +11,688 jobs.

In most of these industries, small business establishments accounted for the preponderance of new growth. In 1985, almost 80% of all business service establishments employed fewer than ten workers; 82% of all business service establishments created between 1975 and 1985 employed fewer than ten workers. Approximately 89% of all health service establishments employed fewer than ten workers in 1985; 83% of the health services establishments created between 1975 and 1985 were also in this size class.

## CONCLUSIONS

### The Status of the Long Island Economy

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Although the Long Island economy remains fundamentally sound, the rapid growth pace of the 1980s is not likely to be sustained into the 1990s. Current economic indicators suggest that the Long Island economy is moving toward a slower growth path. Whether or not the Long Island economy is able to achieve a *soft landing* will depend to some extent on how well Long Island defense firms fare as the Reagan defense buildup winds down and as the competition for remaining defense contracts intensifies. The following chapters analyze Long Island's defense sector in detail. The overall goals are to buttress the competitive position of bi-county aerospace and electronics firms and to institute programs to mitigate the impact of possible defense industry layoffs.



**Table 1.10**  
**The Contribution of Small Business Establishments**  
**To Employment Growth on Long Island, 1975-85**

	<b>Private-Sector Employment Growth 1975-85</b>	<b>—Proportion of Establishments— —Employing Fewer Than Ten Workers—</b>	
		<b>All Establishments, 1985</b>	<b>New Establishments 1975-85</b>
<b>Growth Industry</b>			
Business Services	+39,955	79.8	81.7
Health Services	+26,235	88.8	83.4
Wholesale Trade-Durables	+19,140	72.6	70.3
Eating and Drinking Places	+17,211	71.4	61.1
Electric & Electronic Equipment	+17,193	32.8	24.3
Wholesale Trade-Non-Durables	+11,688	81.2	84.3
Miscellaneous Services	+11,095	89.0	89.7
Miscellaneous Retailing	+10,331	83.9	78.6
Social Services	+8,888	58.0	55.6
Food Stores	+8,369	77.5	83.9
Banking	+6,843	38.5	18.3
Educational Services	+6,361	50.0	74.7
Fabricated Metal Products	+5,863	48.9	25.3
Membership Organizations	+4,562	73.7	66.9
Real Estate	+4,533	92.4	83.4
Legal Services	+4,522	92.0	86.0
Apparel & Accessory Stores	+4,305	77.9	64.3
Insurance Agents & Brokers	+4,107	85.3	69.4

Source: Long Island Regional Planning Board based on data from the U.S. Bureau of the Census.



## CHAPTER 2...

# THE DIMENSIONS OF LONG ISLAND'S DEFENSE SECTOR

This chapter analyzes the structure of the defense sector on Long Island in terms of employment and prime contract awards.

### DEFENSE-RELATED EMPLOYMENT

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Long Island's manufacturing sector is highly skewed toward the defense-related industries. The Defense Department has identified several industries in which a significant proportion of total output consists of defense production. They include shipbuilding, ordnance, aircraft, and radio and TV communications equipment, among others. During the first quarter of 1987, Long Island contained an estimated 71,981 jobs in these defense-related industries. This was equivalent to about 40% of all Long Island manufacturing jobs. Long Island's manufacturing sector became slightly more defense-dependent during the 1980s. In 1980, there were some 64,562 defense-dependent manufacturing jobs on Long Island. This was equivalent to 38.7% of all Long Island manufacturing jobs. The expansion of Long Island's defense sector since 1980 was responsible for the preponderance of manufacturing employment growth in the two counties. Approximately 7,419 defense-related manufacturing jobs were generated on Long Island between 1980 and the first quarter of 1987. This was equivalent to almost 58% of the growth of manufacturing employment on Long Island during this period.

Not all defense-related industries experienced employment increases. Defense-related employment growth on Long Island was concentrated in three industries: radio and TV communications equipment, electronic components and accessories, and aircraft parts and auxiliary equipment. Collectively, these industries added 8,189 jobs. Employment in Long Island's giant aircraft industry, which specializes in air frame production, remained virtually unchanged since 1980. This industry employed almost 23,000 workers in the first quarter of 1987. Thus, the industry mix of defense-related employment on Long Island, although still dominated by the aircraft industry, is shifting toward the development and manufacture of electrical and electronics equipment.



**Table 2.1**  
**Employment in Defense-Related Industries on Long Island,**  
**1980 vs. First Quarter, 1987**

SIC Code	Industry	1980	Employment First Quarter, 1987	Net Change
346	Metal Forgings & Stampings	1,555	1,050	-505
354	Metalworking Machinery & Equipment	2,730	1,751	-979
356	General Industrial Machinery & Equipment	1,939	2,496	+557
361	Electric Transmission & Distribution Equip.	1,654	1,381	-273
3662	Radio & TV Communications Equipment	14,144	19,356	+5,212
367	Electronic Components & Accessories	9,049	10,925	+1,876
3721	Aircraft	22,341	22,662	+321
3724	Aircraft Engines & Engine Parts	336	348	+12
3728	Aircraft Parts & Auxiliary Equip., NEC	3,796	4,897	+1,101
373	Ship & Boat Bldg., & Repair	496	247	-249
381	Search, Detection, Navigation, Guidance, Aeronautical & Nautical Systems, Instruments & Equipment	6,134	6,433	+299
383	Optical Instruments & Lenses	388	435	+47
	<b>Total Defense Related Employment</b>	<b>64,562</b>	<b>71,981</b>	<b>+7,419</b>
	<b>Total Manufacturing Employment</b>	<b>166,642</b>	<b>179,516</b>	<b>+12,874</b>
	<b>% Defense Related</b>	<b>38.7</b>	<b>40.1</b>	<b>57.6</b>

Source: Long Island Regional Planning Board based on data from New York State Labor Department

## PRIME CONTRACT AWARDS

In fiscal year 1987, Long Island firms received defense prime contract awards valued at almost \$5.3 billion. This was equivalent to about 55% of all Defense Department prime contract awards to firms in New York State.

Between fiscal years 1981 and 1987, Long Island firms received defense prime contract awards valued at about \$31.7 billion. The dollar value of awards surged sharply during the 1983-84 period as the Reagan Administration's defense buildup gained momentum. Awards to Long Island firms declined slightly in both fiscal years 1985 and 1986 but increased by 2.6% in fiscal year 1987. Awards in fiscal year 1987, \$5.28 billion, were only 3% lower than the record \$5.46 billion awarded in fiscal 1984.

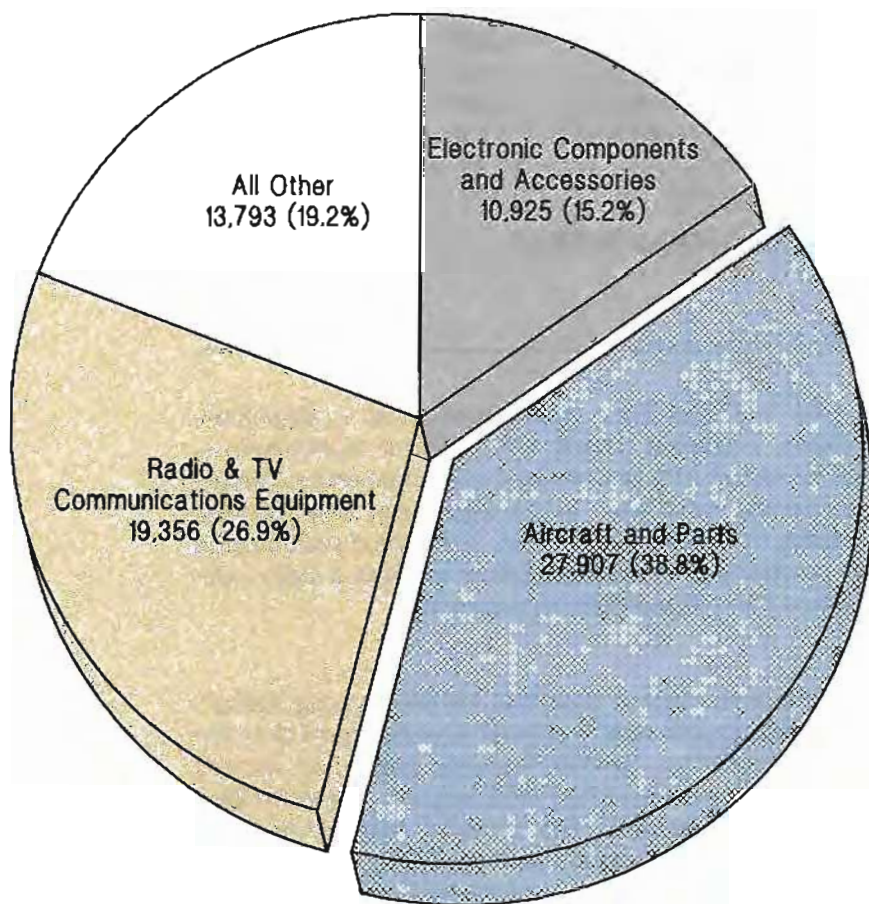
**Table 2.2**  
**The Leading New York State Counties in Terms of**  
**Defense Department Prime Contract Awards**  
**Fiscal Year 1987 (\$000)**

1	<b>Nassau</b>	<b>\$4,469,028</b>
2	Bronx	1,244,348
3	<b>Suffolk</b>	<b>813,503</b>
4	Onondaga	561,740
5	Schenectady	428,626
6	Jefferson	288,901
7	Tioga	270,295
8	Erie	216,173
9	Oneida	203,680
10	Broome	203,103
	<b>Total</b>	<b>8,699,397</b>
	<b>Total-New York State</b>	<b>9,624,803</b>

Source: LIRPB based on data from U.S. Department of Defense.



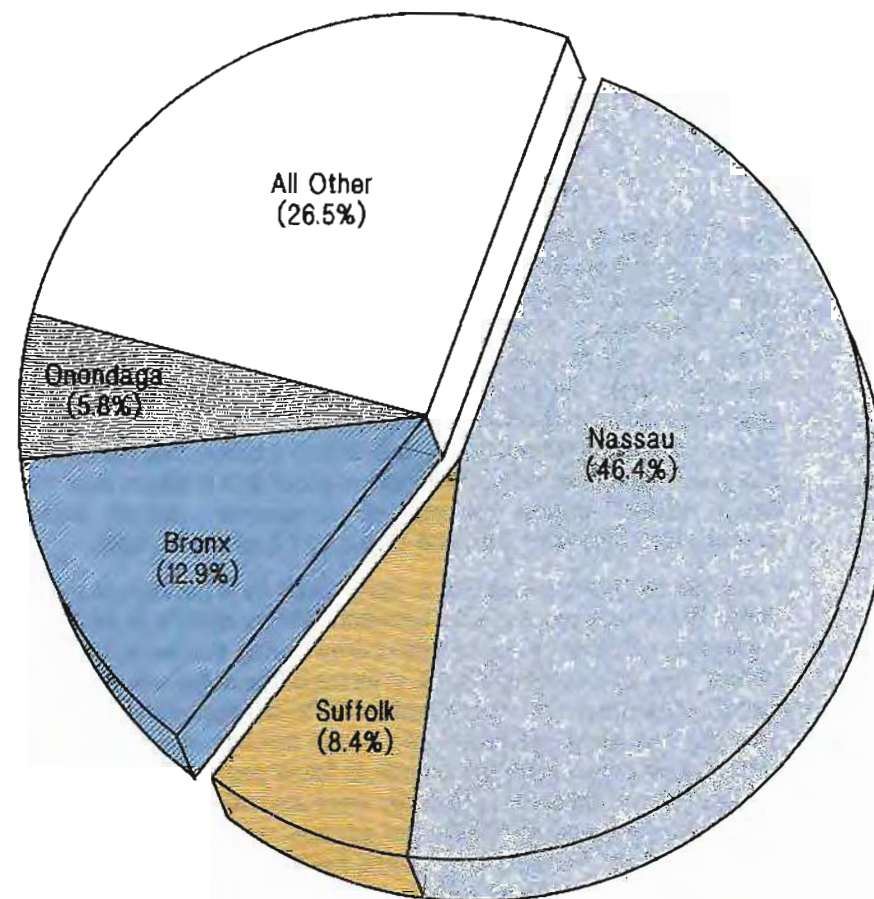
**Figure 2.1**  
**DEFENSE-RELATED EMPLOYMENT ON LONG ISLAND,**  
**by INDUSTRY, FIRST QUARTER, 1987**



**Total Defense-Related Employment 71,981**  
**Total Manufacturing Employment 179,516**  
**Percent Defense-Related 40.1%**

Source: Long Island Regional Planning Board

**Figure 2.2**  
**LEADING NEW YORK STATE COUNTIES**  
**in TERMS OF DEFENSE AWARDS, FISCAL YEAR, 1987**  
**(Percents)**



**Total Awards: \$9.62 Billion**

Source: U.S. Department of Defense



**Table 2.3**  
**Defense Prime Contract Awards to Long Island Firms\* (\$000)**

Fiscal Year	-Value-		Nassau-Suffolk	-Annual Percent Change-		Nassau-Suffolk
	Nassau	Suffolk		Nassau	Suffolk	
1981	2,778,490	337,836	3,116,326			
1982	2,835,727	680,035	3,515,762	+2.1	+101.3	+12.8
1983	3,222,154	722,530	3,944,684	+13.6	+6.2	+12.2
1984	3,738,816	1,723,647	5,462,463	+16.0	+138.6	+38.5
1985	4,024,454	1,252,316	5,276,770	+7.6	-27.3	-3.4
1986	3,783,775	1,362,806	5,146,581	-6.0	+8.8	-2.5
1987	4,469,028	813,503	5,282,531	+18.1	-40.3	+2.6

\*Refers to contract awards of \$10,000 or more

Source: U.S. Department of Defense

The Defense Department estimates that each dollar in direct awards generates \$1.60 in indirect purchases and pay in industries such as business services, finance, insurance, utilities, transportation, warehousing, wholesale and retail trade and manufacturing.<sup>1</sup> If this ratio holds true and the \$31.7 billion in prime contracts awarded during the fiscal 1981-87 period had remained on Long Island, the overall stimulus to the Long Island economy would have been about \$82.4 billion. If only half, or \$15.8 billion, had remained, the overall stimulus would have been about \$41.2 billion over the fiscal 1981-87 period. By way of comparison, private sector payrolls on Long Island totaled about \$17.5 billion in 1985.

Long Island's defense sector is dominated by a handful of major firms. Six firms accounted for between 86% and 90% of all prime contract awards to the Long Island area during the fiscal 1984-86 period. The top twenty-six firms, in terms of the dollar value of contracts, accounted for approximately 95% of total prime contract awards. The remaining 484 Long Island firms receiving Defense Department prime contract awards in fiscal year 1986 accounted for only 5% of total awards. Awards were also relatively concentrated by agency, type of product or service, weapons system and type of contract. For example, during the fiscal 1984 through 1986 period, 67% to 72% of all awards to Long Island firms were made by the U.S. Navy. The preponderance of all awards were made for fixed-wing aircraft or electronic countermeasures equipment. Almost three-quarters of all awards were production awards. During the fiscal 1984-86 period, the major weapons systems for which awards were made included the F-14 Tomcat, the B-1B bomber, the E-2 Hawkeye, the A-6 Intruder and the EA-6B Prowler.

## THE LEADING DEFENSE PLAYERS

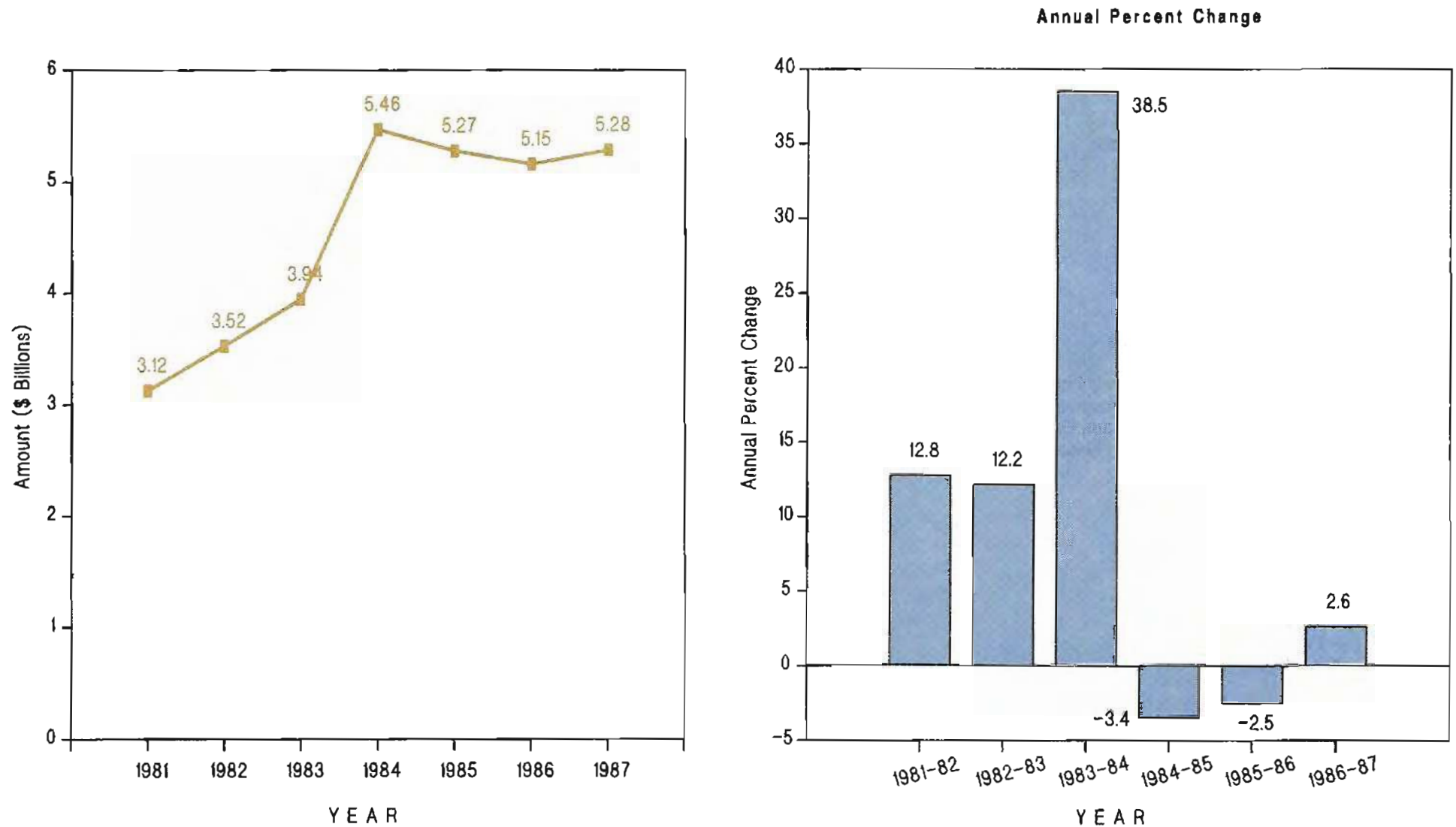
In fiscal year 1987, six Long Island contractors -- Grumman, Unisys, Eaton, Hazeltine, Harris and General Instruments -- accounted for almost 91% of Defense Department prime contract awards to the bi-county area. In the aggregate, they received awards totaling more than \$4.79 billion. The current performance and future prospects of each of these firms will have a major influence on future Long Island defense production.

Recent events have made it clear that several of Long Island's leading defense players face a difficult transition period in the foreseeable future. The Fairchild-Republic plant has already closed following termination of the F-46A program. The move idled an estimated 3,300 workers. The 100-acre Fairchild-Republic Company property is to be sold to developer Wilbur Breslin for \$40 million. The Grumman Corporation purchased Republic's program to support the A-10 and hired about 120 former Republic employees who had been assigned to A-10 design work.

<sup>1</sup>See Rae D. Rosen, "Reduced Defense Expenditures: Where Are The Vulnerable Points in District Two?" *Federal Home Loan Bank of New York*, March, 1988.



**Figure 2.3**  
**DOLLAR VALUE of DEFENSE PRIME CONTRACT AWARDS**  
**to NASSAU-SUFFOLK FIRMS**  
**FISCAL YEARS 1981 through 1987**



Source: U.S. Department of Defense



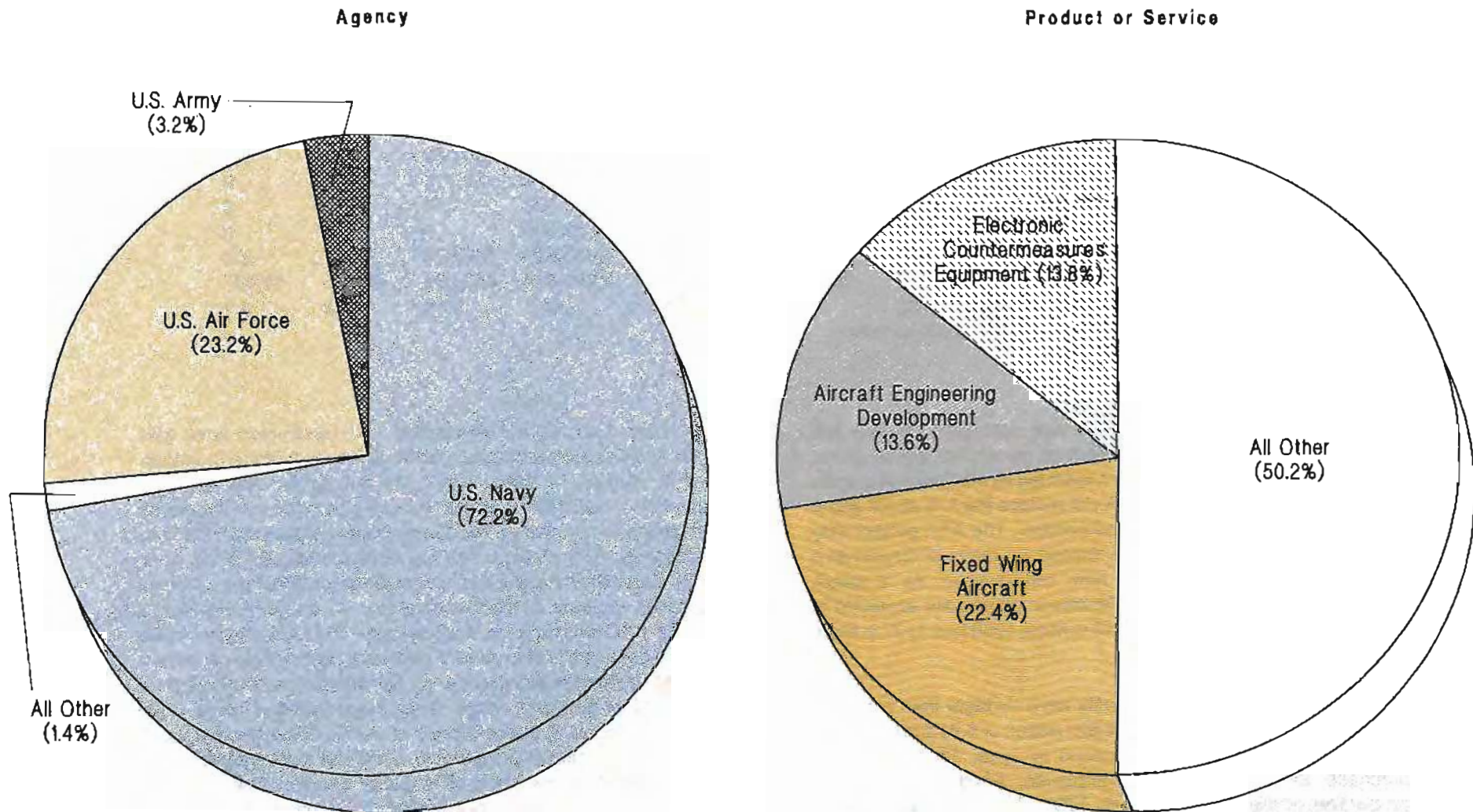
**Table 2.4**  
**The Distribution of Prime Contract Awards by Company, Agency,**  
**Product or Service, Weapons System and Type of Contract**  
**Long Island, Fiscal Years 1984 Through 1986**

	<b>-Percent of Total Awards-</b>		
	<b>Fy 1984</b>	<b>Fy 1985</b>	<b>Fy 1986</b>
<b>1. Company</b>			
Top six	89.5	86.6	90.5
Top seven to sixteen	4.4	5.9	4.0
Top seventeen to twenty-six	1.4	2.0	1.2
All other	4.7	5.5	4.3
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>2. Agency</b>			
U.S. Navy	68.0	67.2	72.2
U.S. Air Force	26.2	25.6	23.2
U.S. Army	4.5	5.2	3.2
All Other	1.3	2.0	1.4
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>3. Type of Product or Service</b>			
Aircraft, Fixed Wing	38.1	16.3	22.4
Electronic Countermeasures Equipment	18.5	18.3	13.8
Aircraft Engineering Development	4.3	7.7	13.6
Electronic & Communications Engineering Development	2.0	4.0	5.4
Missile/Space Engineering Development	3.3	1.6	1.8
Modification of Aircraft	2.9	3.6	2.9
All Other	30.9	48.5	40.1
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>4. Weapons System</b>			
F-14 Tomcat	21.9	17.1	20.4
E-2 Hawkeye	16.1	13.2	12.2
B-1B Bomber	19.6	22.6	15.6
EA-6B Prowler	11.0	13.2	10.6
A-6 Intruder	8.0	11.7	16.3
C-2 Greyhound	4.2	4.0	1.8
A-10	1.9	2.1	0.7
All other	17.3	16.1	22.4
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>5. Type of Contract</b>			
Production	74.7	70.4	58.3
Research and Development	14.8	16.0	24.6
Modify, Alter or Rebuild Equipment	3.6	4.9	4.8
Maintain or Repair Equipment	2.3	3.5	3.4
All Other	4.6	5.2	8.9
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: DMS Marketing Service



**Figure 2.4**  
**DISTRIBUTION OF LONG ISLAND DEFENSE AWARDS, by AGENCY**  
**and TYPE OF PRODUCT OR SERVICE, FISCAL YEAR, 1986**  
**(Percents)**



Source: DMS Marketing Service



**Table 2.5**  
**Long Island's Leading Defense Contractors**  
**Prime Contract Awards\*, Fiscal Year 1987 (\$000)**

Company	Total Award	-Source-				
		Army	Navy	Air Force	Defense Logistics Agency	Other
1. Grumman, Bethpage	3,260,681	21,157	2,789,817	444,436	5,271	0
2. Unisys, Great Neck	907,309	0	878,605	28,644	60	0
3. Eaton, Deer Park	374,599	3,228	167,344	203,079	367	581
4. Hazeltine, Greenlawn	124,165	13,497	80,179	29,717	772	0
5. Harris Corp., Syosset	75,617	0	75,590	0	27	0
6. General Instrument Corp., Hicksville	52,088	0	52,088	0	0	0
<b>Total</b>	<b>4,794,459</b>	<b>37,882</b>	<b>4,043,623</b>	<b>705,876</b>	<b>6,497</b>	<b>581</b>
<b>All Contracts, Nassau-Suffolk</b>	<b>5,282,531</b>	<b>163,424</b>	<b>4,207,014</b>	<b>840,081</b>	<b>53,415</b>	<b>18,597</b>
<b>Share, Top Six Contractors</b>	<b>90.8</b>	<b>23.2</b>	<b>96.1</b>	<b>84.0</b>	<b>12.2</b>	<b>3.1</b>

\*Refers to prime contract awards valued at \$10,000 or more.

Source: U.S. Department of Defense

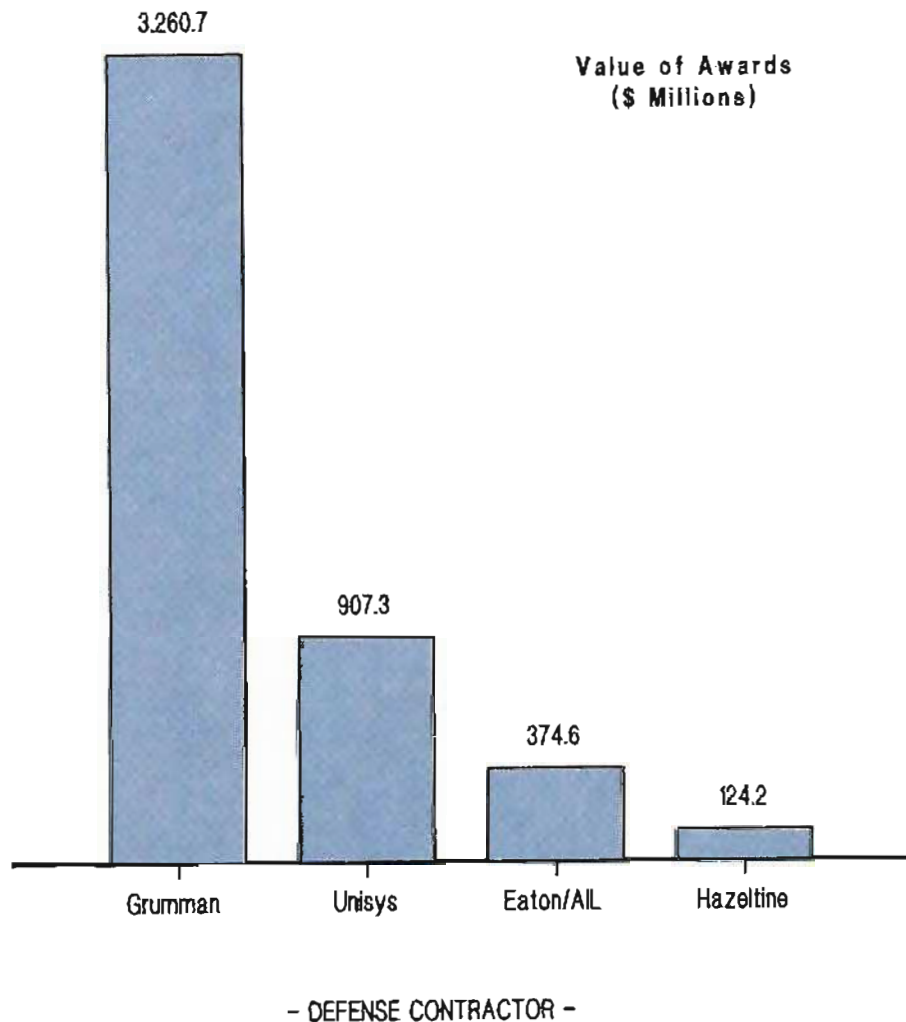
Grumman, Long Island's largest defense contractor, recently lost the competition to build the Navy's next generation attack plane, the Advanced Tactical Aircraft, to a team led by McDonnell Douglas and General Dynamics. The ATA will replace the A-6 attack plane as the Navy's prime carrier-based bomber. The ATA project may be worth as much as \$45 billion. Moreover, many of Grumman's existing aircraft programs are now *middle-aged*. As a result, Defense Department orders of Grumman planes are expected to taper off from 57 in fiscal 1987 to 40 in fiscal 1988 to only 27 in fiscal 1989.

Grumman's first quarter 1988 profits were stronger than expected -- its quarterly operating profit was \$21 million or \$.61 a share -- and the Defense Department announced in June, 1988 that it will purchase ten additional A-6E airplanes, which would extend production of the aircraft through 1991. Grumman nevertheless plans to reduce its workforce by some 2,600 persons. Grumman currently employs 23,500 persons on Long Island and 33,700 overall. Grumman has experienced four years of declining earnings and is saddled with more than \$600 million in long-term debt.

Other major Long Island aerospace and electronics firms also appear to be at a crossroads in terms of future defense business. The AIL Division of Eaton has been put up for sale following completion of a \$3 billion contract to build electronic warfare equipment for the B-1B bomber. AIL has announced plans to reduce its workforce by 10% during 1988 because of reduced B-1B work. Unisys' Surveillance and Fire-Control Systems Division has won a \$10 million contract to demonstrate that it can build the Navy's Aegis SPY-1D ship radar defense system. The total program could be worth some \$10 billion over a two-year period. The contract is expected to stabilize the Company's Great Neck workforce but will not add many new jobs at the Great Neck facility. Unisys' Shipboard and Ground Systems Group, located in Great Neck, is working on a \$500 million program to build the next generation of weather radars for the National Weather Service. However, only the design work will be performed at the Great Neck facility. In August, 1987, one hundred workers were laid off when the company failed to win contracts to build automated test equipment for the Air Force's A-7 fighter aircraft and a laser system for the Star Wars program.



**Figure 2.5**  
**LONG ISLAND'S LEADING DEFENSE CONTRACTORS**  
**FISCAL YEAR 1987**



Harris Corporation's Government Support Systems Division, located in Syosset, employs some 2,000 workers. The Division recently lost the competition to build the Consolidated Automated Support System, a contract which is estimated to be worth some \$2 billion. The Division is currently building automated test equipment for the Navy's F/A-18 and Canada's CF-18 fighter. It is slated to begin production of an automated test system for the Air Force, worth an estimated \$30 million, in 1988. However, the Division's prime manufacturing work will end in approximately two years. Their prime work includes a line of Navy automatic test equipment computers known as ATS (V)1, ATS (V)2 and the Hybrid Test System. The Division has traditionally been a Navy contractor but is seeking to diversify into Air Force work. It is likely to remain a leader in the automatic test equipment field.

Hazeltine employs some 2,400 workers on Long Island. In 1986, Hazeltine lost a \$1 billion contract to build a tactical communications system -- known as the Joint Tactical Information Distribution System -- for the Air Force. Hazeltine is currently building 178 Microwave Landing Systems for the Federal Aviation Administration under a \$90.6 million contract it won in 1983. The FAA wants to buy 1,250 additional MLS units to replace its aging instrument landing systems at most major airports. However, the MLS project, Hazeltine's largest single contract, was recently criticized by the General Accounting Office for running behind schedule and over budget. In addition, the MLS technology is now ten years old and, with new technologies becoming available, the GAO wants the MLS system tested further before any additional new units are purchased. The \$20 million earmarked for the program in the fiscal 1989 budget is not for the construction of new units but for development of a more advanced system. Moreover, Hazeltine's destiny is no longer solely in its own hands. In October, 1986, Hazeltine was purchased by the Emerson Electric Company of St. Louis.



## CONCLUSIONS

### The Dimensions of Long Island's Defense Sector

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Long Island has a relatively large defense sector. In fiscal year 1987, Long Island firms received about 55% of all Defense Department prime contracts awarded to firms in New York State. The Long Island defense sector remains dominated by a handful of major firms. Six firms -- Grumman, Unisys, Eaton, Hazeltine, Harris and General Instrument -- accounted for almost 91% of all prime contract awards to Long Island firms during fiscal 1987. Recent events suggest that many of these key players face a difficult transition period. This, in turn, could cause problems for Long Island's second and third-tier defense suppliers, many of whom depend on one of the larger firms for a preponderance of their business.

Dramatic changes in the fortunes of Long Island's aerospace and electronics firms have been accompanied by equally dramatic changes in the overall competitive climate within the defense industry. Chapter 3 explores some of these changes.



### CHAPTER 3...

# THE CHANGING COMPETITIVE CLIMATE WITHIN THE DEFENSE INDUSTRY

The U.S. government is attempting to reduce and streamline the cost of weapons development and procurement. As part of this process, it is shifting additional business risk to the defense contractors themselves. As a result, Long Island defense suppliers are being asked to function in a drastically-altered business environment.

Much of the current emphasis on cost containment in the defense industry stems from adverse publicity about \$400 hammers for the Air Force and \$625 ashtrays for the Navy. This led to creation of the Packard Commission on Defense Management headed by David Packard, Chairman of the Board of Hewlett-Packard Corporation. The Commission recommended that most weapons programs be subject to competition, that purchasing practices be streamlined and that the Department of Defense purchase more off-the-shelf equipment. It also recommended that Congress create the post of Undersecretary of Defense for Acquisitions. That post has since been created. The Undersecretary has authority over weapons purchases.

A number of major policy changes have followed in the wake of the Commission's report:

1. Contractors must now fund a greater share of initial research and development costs. Contractors must now share development costs with the Pentagon, which means that they often incur a loss on development contracts. Moreover, they no longer have a guarantee that the program will continue into production or, if it continues, that they will be awarded the follow-on production contract.
2. Contractors must now fund at least 50% of their expenses for tooling and test equipment. In the past, these expenses were reimbursable as they occurred. Contractors must also bear the costs of marketing their weapons abroad.
3. Progress payments have been reduced from 90% to 75% of the contractor's monthly expenses and payments are often made after 30 days instead of 15.



4. The Defense Department's profit policy has been revised to attain a reduction in contractor earnings. The Pentagon profit policy was changed as a result of three studies: A Defense Financial and Investment Review published in 1985, a recent General Accounting Office report and a recent Navy study concerning contractor profits. The Defense Financial and Investment Review found that contractor profits were comparable to the profits of commercial firms but nevertheless concluded that the markup on negotiated contracts should be reduced. The GAO report concluded that defense contracting is more profitable than commercial business because defense contractors receive financing from the government while commercial firms receive financing from financial institutions or private-sector customers. The Navy study concluded that the profits of Navy contractors exceeded those of commercial firms.
5. The Defense Department has adopted a *could cost* approach to introduce competition into sole source situations. In fiscal year 1987, the Navy spent \$49.4 billion on procurement; 55.3% was awarded under competitive contracts as compared with only 30.5% in fiscal 1983. Air Force procurement spending totaled \$40.4 billion in fiscal 1987; 56.5% was competitively awarded as compared with only 32.4% in fiscal 1983.
6. The Tax Reform Act of 1986 repealed the completed contract method of accounting for taxes and eliminated the investment tax credit. Defense contractors are now required to pay taxes annually on a portion of their completed contracts, regardless of whether they actually realize a profit on those contracts in a given year. The tax deferral permitted by the completed contract method has been a significant source of cash to finance other program investments.
7. The Pentagon has imposed higher administrative costs on defense contractors by virtue of more stringent government record-keeping requirements.
8. Recent changes in Federal Acquisition Regulations (FAR) shift the burden of proof of the reasonableness of contractor costs from the government to the contractor and abolish the presumption of reasonableness attached to incurred costs.

Thus, if the contracting officer or auditor challenges the reasonableness of a specific cost, the burden of proof will be upon the contractor to establish that such cost is reasonable.

9. The Pentagon is stressing concurrent development and production of weapons systems incorporating new technologies in order to reduce the time needed to introduce advanced technologies into the weapons arsenal. This creates additional development risks for defense contractors.

The foregoing policies were implemented to more accurately reflect commercial business practices. The underlying assumption was that the law of supply and demand functions as well in the defense marketplace as in the commercial marketplace. However, whereas price is relatively independent of cost in a commercial program, price is established through negotiations and is calculated as a percentage of cost in the defense area. Moreover, competitive pricing may not be economically efficient with respect to products that utilize unstable, evolving technologies. Also, second sourcing is not commercially feasible if only a small number of weapons are to be purchased. For example, only six additional Trident submarines are planned and it would be impractical to tool up a second shipyard to build them. Northrop will remain the prime contractor on the \$36 billion Stealth Bomber Program because only 132 such aircraft are planned.

## FINANCIAL IMPACT on DEFENSE CONTRACTORS

A number of studies have evaluated the financial impact of recent Defense Department policy changes on defense contractors. One of the more comprehensive reports, entitled: *The Impact of Government Policies on Defense Contractors* was published by the Financial Executives Institute Committee on Government Business in July, 1987.<sup>2</sup> The report underscored the fact that during the mid-1970s, the government encouraged investment in the defense industry. This, in turn, strengthened cash flow so that the

<sup>2</sup>The Financial Executives Institute is a professional organization of senior financial and administrative officers in business.



return to contractors became commensurate with the business risks they assumed. The report notes that recent policies have reversed these trends and have dramatically changed the economics of defense contracting. For example, recent policy changes mean that the contractor must make a greater up-front investment. This investment generates additional interest costs which are not recoverable under government contracting rules. As a result, the contractor's cumulative cash flow is reduced. Cumulative cash flow is defined as the amount of cash that the contractor invests in a program plus the cash return generated by that program. The new policies have increased the financial risks borne by defense contractors because the level of up-front contractor investment has increased, the period of time needed to recoup that investment has been lengthened and the anticipated return has declined.

At best, there is considerable risk inherent in defense contracting because the investment is made at the beginning of a program and the cash return is not realized until the end. There is the risk that the cash return may not be fully realized because the Defense Department will terminate the program prematurely or make costly design changes. In addition, future dollars are worth less than dollars invested earlier because inflation is constantly eroding the value of the dollar.

The Financial Executives Institute concluded that as a result of recent policy changes, current earnings levels in the defense industry do not adequately compensate defense contractors for the risks involved. The report cited these potential consequences of the growing imbalance between risks and rewards:

1. Defense contractors may fail to invest sufficiently to modernize their facilities and to adopt the latest manufacturing technologies.
2. Investment opportunities outside the defense industry may become more attractive and this could lead to the shrinkage of the defense industrial base.
3. Competition in the defense industry could actually decline as the entry level of investment increases without a corresponding increase in potential return.
4. U.S. defense contractors could become less competitive in international markets. This would have an adverse impact on the U.S. balance of payments. In 1987, the aerospace industry had a favorable trade balance of \$17 billion.

5. The U.S. defense industry could lose its global lead in technology.

The MAC Group, a management consulting firm in Cambridge, Massachusetts came to a similar set of conclusions. Their study, entitled *The Impact on Defense Industrial Capability of Changes in Procurement and Tax Policy, 1984-1987* used financial data from nine representative companies to quantify the financial impact of recent Defense Department policy changes. The products represented included aircraft, missiles and electronics and the customers included the Army, Navy and the Air Force. The nine companies studied collectively accounted for 25% of the Defense Department's 1986 prime contract awards. The study calculated actual program and company financial performance and then restated this performance assuming that recent policy changes had been in effect throughout the program.

The study found that recent Pentagon policy shifts would have required \$8.5 billion in additional financing for the nine companies. This would have been equivalent to half their 1985 equity. In addition, the new regulations would have reduced profits on the defense business of the nine firms by an average of 23%. The MAC study concluded that the return on equity would have declined by 30% if the additional financing involved debt capital and by 40% if the additional financing were obtained through an equity issue. Like the Financial Executives Institute, the MAC Group found that the new Pentagon policies would reduce research and development expenditures in the defense industry and limit investment for productivity enhancement. They could also lead to risk aversion tactics, such as the use of low-technology alternatives, when in fact the Defense Department's goal is to enhance technological innovation within the defense industry.

Some of these consequences are already being realized. Independent research and development by defense firms has declined from \$5.1 billion or 5.8% of the value of military contracts in 1984 to \$4.9 billion or 4.4% of the value of contracts in 1986. Second sourcing and more intense competition within the defense industry has also led to more *teaming*, a process whereby two or more defense firms team up with each other to compete for a given program. Theoretically, this spreads the risk and allows firms to pool their technical expertise so as to maximize opportunities for



technological breakthroughs. In reality, however, team participants are potential competitors and they may be reluctant to reveal their most sophisticated innovations to each other. Also, to the extent that teaming is effective, it tends to eliminate competition within the defense industry.

It is clear that the Pentagon's goal is to enhance U.S. manufacturing productivity, to promote a strong U.S. technological and manufacturing base and at the same time to encourage cost-effective defense spending. These goals are tantamount to a *Pentagon Industrial Policy*. In order to achieve them it may be necessary to restructure not only the defense industry, but also the underlying industrial base.

The Defense Department appears to be moving away from some of the more destructive policy innovations of the recent past. Robert Costello, the new Undersecretary of Defense for Acquisitions, has shifted the emphasis away from increased competition and toward basic *cultural* changes within the defense industry. The cost of individual systems is being downplayed and there is increasing concern about the process by which these systems are manufactured. An experiment known as IMIP, the Industrial Modernization Incentives Program, seeks to bring the most advanced factory technologies into the nation's military plants. It provides economic incentives for improving manufacturing processes. Despite this shift in emphasis, Long Island defense firms remain confronted by heightened competition and no longer have any assurance that the potential return on any defense program will be sufficient to justify the up-front investment involved. This imbalance is likely to dampen the enthusiasm of the financial community toward defense firms and could impair the ability of Long Island's defense industry to secure long-term financing at reasonable rates of interest.

The current defense scandal could exacerbate the problem. It comes at a time when the relationship between the defense industry and the Pentagon has become increasingly adversarial. It also comes at a time of declining defense expenditures. The scandal is likely to prevent the Defense Department from modifying some of its more onerous and unrealistic procurement policies. It could even prompt more stringent regulation of the defense industry. As the scandal unfolds, some companies could be prohibited from getting new Pentagon business; several big contracts,

including that for the Navy's Advanced Tactical Aircraft, could be overturned; and, progress payments on some programs could be withheld. The scandal has tarnished the image of the defense industry and may lead to major changes in the manner in which the industry deals with the Pentagon.

## THE IMPLICATIONS of MORE STRINGENT DEFENSE BUDGETS

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New Pentagon procurement policies are one aspect of the changing competitive climate within the defense industry. The future competitive climate will also be influenced by the fact that there will be less defense business to go around. This section analyzes the potential impact of declining defense budgets. National defense expenditures as a percentage of GNP have fluctuated widely over time. They rose from a low of 3.7% of GNP in fiscal year 1948 to a post-World War II peak of 14.6% of GNP in 1953 during the Korean War. The ratio of defense spending to GNP declined thereafter. It was 7.7% in 1965, 9.9% in 1968, 5.8% in 1974, and bottomed out at 4.8% in 1979. The ratio of defense spending to GNP then began to rise as a result of the Reagan defense buildup. It stood at 5.0% in 1980, 5.3% in 1981, 5.9% in 1982, 6.3% in 1983 and 6.2% in 1984.

The real increase in defense expenditures peaked at 8.6% in fiscal year 1985. Spending increases, expressed in 1982 dollars, tapered off to 5.9% in fiscal 1986 and 2.8% in fiscal 1987. Real declines in defense spending are forecast for fiscal years 1988 and 1989. Moreover, only slight increases in real spending are anticipated for the fiscal 1990-93 period: 0.5% in 1990, 1.2% in 1991, 1.9% in 1992 and 2.4% in 1993. In fiscal 1993, Defense Department expenditures are expected to be \$351.3 billion in current dollars and to account for 5.4% of GNP.

The defense functions of greatest significance to Long Island are procurement and research, development, testing and evaluation. Procurement expenditures, which increased by 23.9% in current dollars during fiscal 1983, are expected to decline by 1.9% in current dollars in fiscal year 1988 and to increase by only 0.8% in fiscal 1989, 1.0% in fiscal 1990, 2.4% in fiscal 1991, 5.7% in fiscal 1992 and 5.8% in fiscal 1993. Expenditures for RDT & E, which increased by 15.9% in current dollars in fiscal year 1983, are expected to decline by 1.4% in fiscal 1988 and to increase by between 4.4% and 5.5% during the fiscal 1990-93 period.



**Table 3.1**  
**U.S. Defense Expenditures in**  
**Current and 1982 Dollars, Fiscal Years 1976-84**  
**(\$ Billions)**

Fiscal Year	Current Dollars	Percent Change	1982 Dollars	Percent Change	As a Percent of GNP*
1976	89.6		153.6		5.3
1977	97.2	+8.5	154.3	+0.5	5.0
1978	104.5	+7.5	155.0	+0.5	4.8
1979	116.3	+11.3	159.1	+2.6	4.8
1980	134.0	+15.2	164.0	+3.1	5.0
1981	157.5	+17.5	171.4	+4.5	5.3
1982	185.3	+17.7	185.3	+8.1	5.9
1983	209.9	+13.3	201.3	+8.6	6.3
1984	227.4	+8.3	211.3	+5.0	6.2

\*Current dollars as a percent of GNP

Source: U.S. Office of Management and Budget

**Table 3.3**  
**Defense Outlays for Procurement**  
**and RDT & E, Fiscal Years 1982 Through 1993**  
**(in Billions of Current Dollars)**

Fiscal Year	Procurement	Percent Change	RDT & E	Percent Change
1982	43.3		17.7	
1983	53.6	+23.9	20.6	+15.9
1984	61.9	+15.5	23.1	+12.5
1985	70.4	+13.7	27.1	+17.2
1986	76.5	+8.7	32.3	+19.1
1987	80.7	+5.5	33.6	+4.1
1988*	79.2	-1.9	33.1	-1.4
1989*	79.8	+0.8	36.3	+9.6
1990*	80.6	+1.0	38.2	+5.3
1991*	82.5	+2.4	40.3	+5.5
1992*	87.2	+5.7	42.2	+4.7
1993*	92.3	+5.8	44.1	+4.4

\*Projected

Source: U.S. Office of Management and Budget

**Table 3.2**  
**Projected Increases in Defense Spending Through Fiscal Year**  
**1993, Current and 1982 Dollars (\$ Billions)**

Fiscal Year	Current Dollars	Percent Change	1982 Dollars	Percent Change	As a Percent of GNP**
1985	252.7	+11.1	229.4	+8.6	6.4
1986	273.4	+8.2	243.0	+5.9	6.5
1987	282.0	+3.2	249.8	+2.8	6.4
1988*	285.4	+1.2	243.5	-2.5	6.1
1989*	294.0	+3.0	241.6	-0.8	5.9
1990*	306.2	+4.1	242.7	+0.5	5.7
1991*	320.2	+4.6	245.6	+1.2	5.6
1992*	335.4	+4.7	250.2	+1.9	5.5
1993*	351.3	+4.7	256.3	+2.4	5.4

\*Projected

\*\*Current dollars as a percent of GNP

Source: U.S. Office of Management and Budget

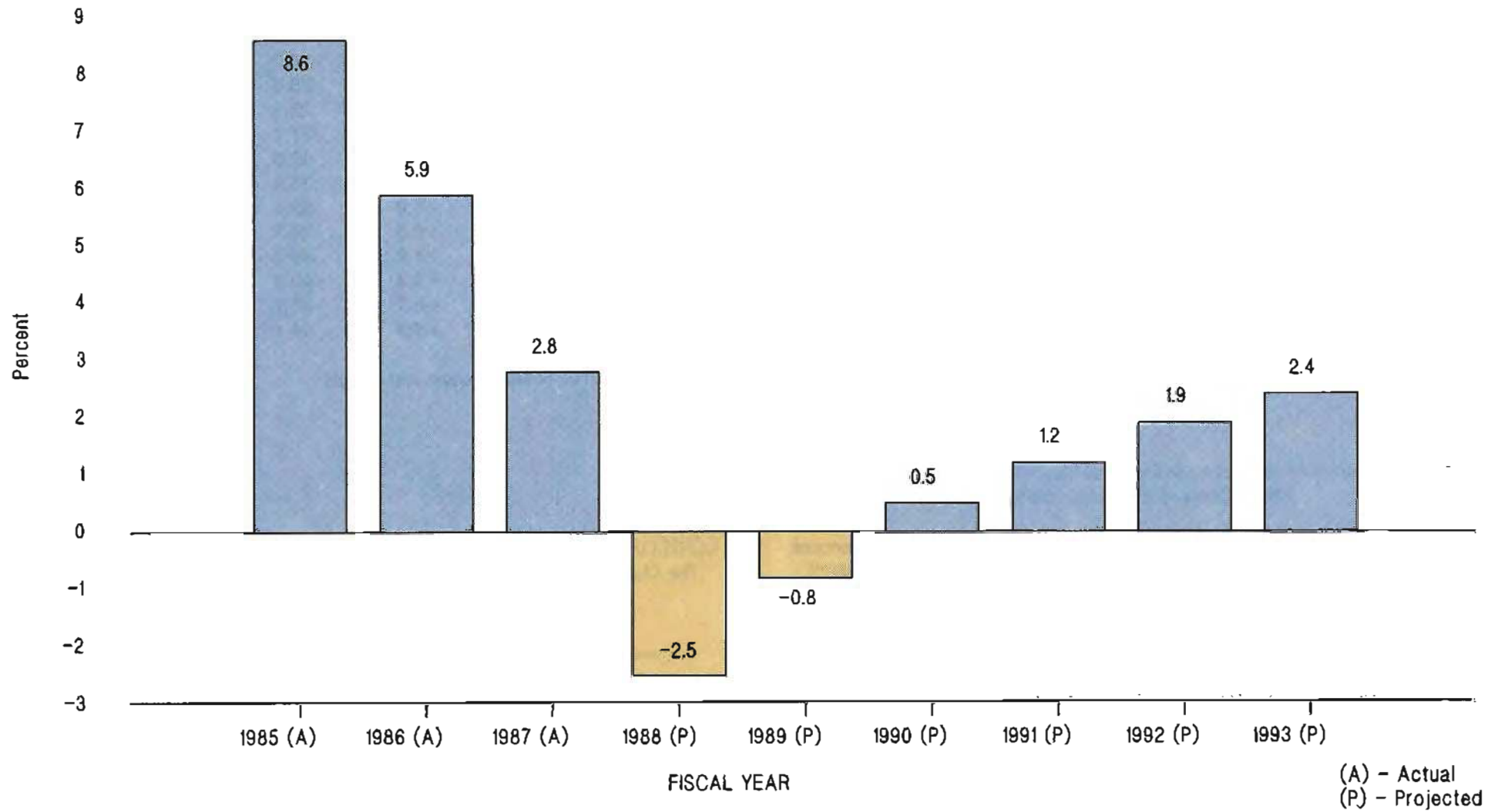
## CONCLUSIONS

### The Changing Competitive Climate Within the Defense Industry

During the 1990s, Long Island defense contractors will be competing for their share of a slowly-growing, even a shrinking, defense pie. Slowly-growing defense expenditures coupled with more stringent procurement rules and regulations are likely to depress defense industry profits both on Long Island and nationally. Moreover, Defense Department procurement policies could be tightened even further in reaction to the current defense scandal. Thus, the outlook is for much leaner times for the defense industry as we move into the 1990s.



**Figure 3.1**  
**PROJECTED CHANGES IN U.S. DEFENSE SPENDING**  
**in CONSTANT DOLLARS**  
**(Percents)**



Source: U.S. Department of Defense



# CHAPTER 4...

## LONG ISLAND'S COMPETITIVE POSITION FOR DEFENSE PRODUCTION

Chapter 4 analyzes Long Island's relative competitive position for defense production. It evaluates relative wage costs for an array of clerical, professional and technical, skilled craft and unskilled plant occupations. It also analyzes relative tax levels, housing costs, energy costs and worker productivity.

### RELATIVE WAGE COSTS

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Long Island's economic base is increasingly predicated on *thoughtware* activities that require a sophisticated level of technical expertise. Therefore, one of Long Island's major competitive assets is its stock of human capital. Long Island possesses a skilled and highly-educated labor force. In 1980, the two counties contained approximately 158,000 workers with executive, administrative and managerial skills, 177,000 workers with professional specialties such as engineering, math and science, 32,000 technicians and 146,000 precision craft workers. Because Long Island specializes in state-of-the-art industries in which the quality of the labor force is so important, there is a tendency to downplay labor costs. However, given the current DOD emphasis on cost containment, the cost of labor has become a much more critical variable. Moreover, with future job growth expected to exceed future labor force growth on Long Island, the inability to obtain a suitable labor force at competitive wages could cause existing defense firms to relocate some or all of their operations to lower-cost areas.

The following analysis of relative Long Island wage costs is based on an August, 1987 wage survey of Long Island employers conducted by the U.S. Department of Labor. For purposes of analysis, Nassau-Suffolk wage costs have been compared with those for the following metropolitan areas: New York, Atlanta, Baltimore, Boston, Milwaukee, Houston and San Francisco.



Much of Long Island's recent employment growth reflects the influx of back office operations that require a large clerical workforce. The entry of significant numbers of women into the Long Island labor force during the 1970s and 1980s provided the clerical workers to staff Long Island's expanding office complexes. The defense industry also employs a large number of clerical workers. In August, 1987, Long Island clerical wage costs were generally below those in the adjacent New York Metropolitan Area, which includes New York City. For example, accounting clerks and key entry operators were paid 88% of the comparable regional wage. Long Island clerical wage costs were well below those in the Houston and San Francisco areas and generally below those in the Atlanta and Boston areas. However, Long Island clerical workers generally received higher wages than those in the Baltimore and Milwaukee areas.

An ample supply of well-trained professional and technical workers is also vital to the continued prosperity of Long Island's defense industry. Drafters and electronics technicians are well represented within the defense sector. In August, 1987, drafters on Long Island were paid an average weekly wage of \$470.50. This was 5% below the comparable wage for the adjacent New York Metropolitan area, 2% below comparable Baltimore wages, 6% below comparable Boston wages, almost 13% below comparable wages in Houston and 18% below comparable wages in the San Francisco metropolitan area. Electronics technicians were paid \$407.00 weekly on Long Island, a wage well below that of the other metropolitan areas studied. For example, electronics technicians in the San Francisco area earned 54% more, those in the Houston area earned 30% more and those in the Atlanta area earned 23% more. Computer systems analysts and computer programmers are also essential to the defense industry. In August, 1987, they were paid \$751.70 and \$567.50 weekly respectively on Long Island. Computer systems analysts on Long Island were paid less than in the New York, Houston and San Francisco areas but earned almost 8% more than in the Atlanta area and 9% more than in the Baltimore area. The same wage pattern applied to computer programmers. The survey did not cover engineering salaries.

Aerospace production also requires highly-skilled craftspersons. Therefore, the relative wages of skilled craft workers influence the

competitive position of Long Island defense firms. Two typical craft occupations are machinists and tool and die makers. In August, 1987, machinists were paid an average hourly wage of \$15.90 on Long Island. This exceeded the average hourly wage in the other metropolitan areas studied. It was 1% above comparable wages in the New York Region, 14% above those in the Atlanta area, 23% above comparable wages in the Baltimore area, 26% above those in the Boston area, and 11% above comparable wages in the Houston area. Tool and die makers were paid \$14.35 hourly on Long Island, slightly less than in the Atlanta, Baltimore, Boston and Milwaukee areas, but 17% more than in the adjacent New York area and 12% more than in the Houston area.

The prosperity of Long Island's defense sector also depends to some extent on relative wage costs for unskilled plant workers. Typical occupations include material handling laborers and guards. In August, 1987, material handling laborers on Long Island were paid \$7.16 hourly. This was 28% below the comparable wage in the New York area, 30% below that in the Atlanta area, 25% below that in the Baltimore area, 24% below that in the Boston area, 34% below that in the Milwaukee area and 40% below that in the San Francisco area. Long Island wages for this group of workers were 4% higher than in the Houston area. Guards were paid \$6.90 hourly on Long Island, 24% more than in the New York area, 14% more than in the Atlanta area, 29% more than in the Baltimore and Milwaukee areas, 15% more than in the Boston area, 23% more than in the Houston area and 10% more than in the San Francisco area.

The foregoing analysis suggests that Long Island wage costs are generally not out-of-line with comparable wage costs in other metropolitan areas, including those located in the sunbelt. However, Long Island wages have begun to rise more rapidly than wages in competing metropolitan areas. For example, bi-county wages for file clerks increased by 9.6% between August, 1985 and August, 1986 and by an additional 11.3% between August, 1986 and August, 1987 for a total increase of almost 21% in two years. The comparable increase was only 3.3% in the adjacent New York metropolitan area, 9.2% in Houston and 5.3% in San Francisco.



**Table 4.1**  
**Average Weekly or Hourly Earnings For Selected Occupations**  
**Nassau-Suffolk vs. Selected Metropolitan Areas**

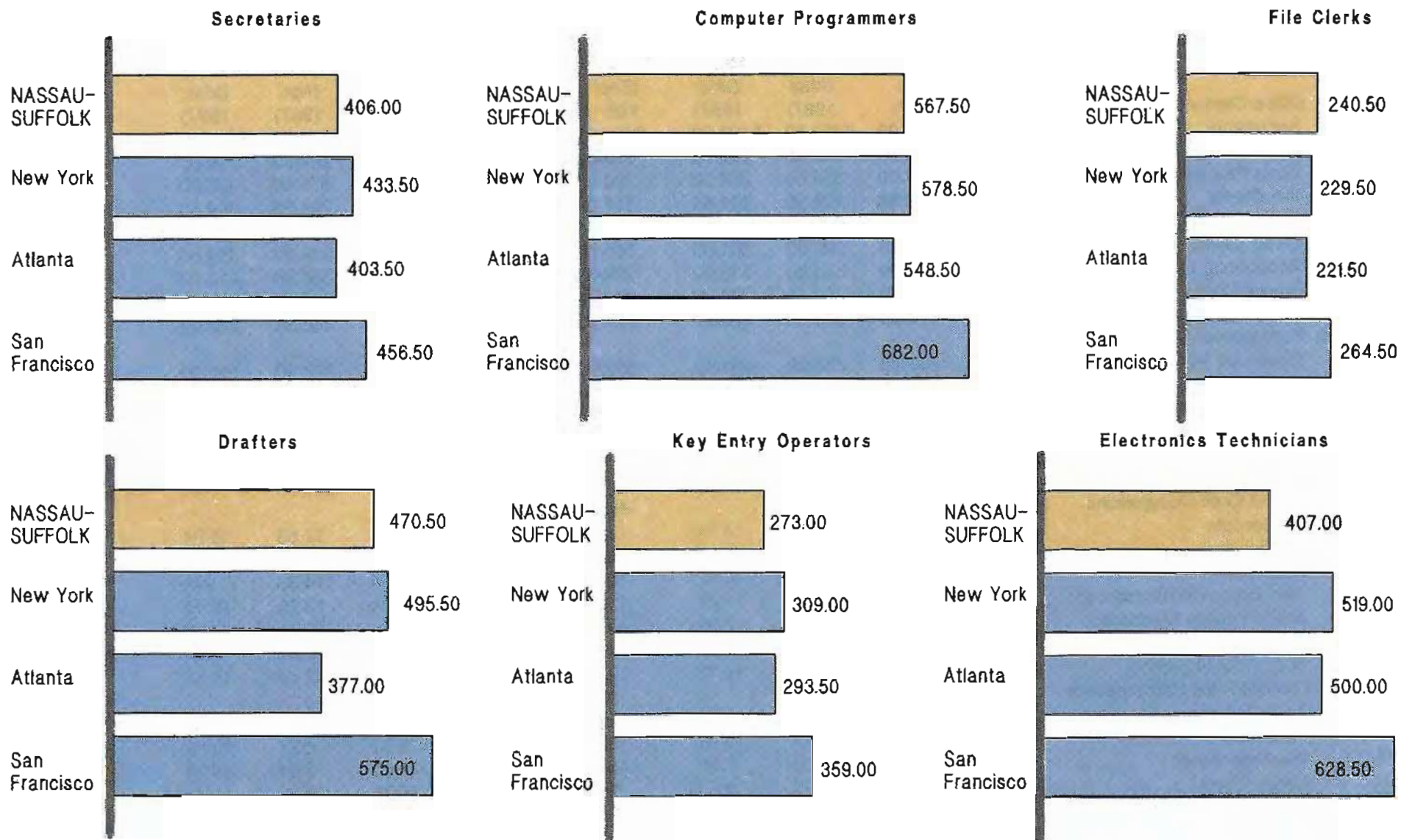
	<b>-Weekly Earnings-</b>							
	<b>Nassau-Suffolk</b>	<b>New York</b>	<b>Atlanta</b>	<b>Baltimore</b>	<b>Boston</b>	<b>Milwaukee</b>	<b>Houston</b>	<b>San Francisco</b>
	(Aug. 1987)	(May 1987)	(May 1987)	(Sept. 1987)	(Aug. 1987)	(May 1987)	(Apr. 1987)	(Mar. 1987)
<b>1. Office Clerical Occupations</b>								
Secretaries	<b>\$406.00</b>	\$433.50	\$403.50	\$424.00	\$403.50	\$371.00	\$438.50	\$456.50
Typists	<b>264.50</b>	272.00	269.00	309.00	272.00	298.00	287.50	399.00
Word Processors	<b>337.00</b>	354.50	359.50	326.00	350.50	303.50	376.50	402.00
File Clerks	<b>240.50</b>	229.50	221.50	214.00	241.50	214.00	264.50	264.50
Switchboard Operators	<b>263.50</b>	302.50	261.00	253.00	291.00	268.50	266.00	316.00
Order Clerks	<b>274.00</b>	305.00	301.00	266.00	276.50	320.00	319.00	359.50
Accounting Clerks	<b>301.50</b>	343.50	330.00	299.00	333.00	289.50	338.50	412.00
Payroll Clerks	<b>316.50</b>	364.00	328.00	332.00	350.50	333.00	375.00	422.50
Key Entry Operators	<b>273.00</b>	309.00	293.50	274.50	304.00	265.50	308.50	359.00
<b>2. Professional &amp; Technical Occupations</b>								
Computer Systems Analysts	<b>751.70</b>	786.50	698.50	689.50	712.50	693.00	808.50	752.00
Computer Programmers	<b>567.50</b>	578.50	548.50	521.00	555.50	506.50	604.50	682.00
Computer Operators	<b>362.50</b>	413.50	412.50	393.00	393.50	376.50	399.50	431.00
Drafters	<b>470.50</b>	495.50	377.00	480.50	502.00	459.50	538.00	575.00
Electronics Technicians	<b>407.00</b>	519.00	500.00	530.50	466.50	544.50	529.50	628.50
Registered Industrial Nurses	<b>476.00</b>	564.50	557.00	538.50	512.00	506.50	565.00	NA
<b>3. Skilled Craft Occupations</b>				<b>-Hourly Earnings-</b>				
Carpenters	<b>12.39</b>	13.98	14.14	12.59	13.09	13.93	12.69	18.04
Electricians	<b>14.64</b>	14.77	15.04	13.87	14.40	15.48	14.66	21.72
Machinists	<b>15.90</b>	15.68	13.92	12.94	12.64	15.86	14.30	NA
Mechanics (Maintenance)	<b>12.17</b>	11.42	11.97	13.55	11.97	12.94	13.75	17.78
Motor Vehicle Mechanics	<b>11.66</b>	13.52	12.35	13.01	14.55	13.48	12.38	17.62
Tool & Die Makers	<b>14.35</b>	12.22	14.63	14.51	14.95	14.90	12.84	NA
Stationary Engineers	<b>15.76</b>	16.25	14.12	13.60	14.40	13.66	12.75	18.45
<b>4. Unskilled Plant Occupations</b>								
Truck Drivers	<b>12.21</b>	14.20	11.41	11.06	12.87	13.24	9.54	12.09
Receivers	<b>8.90</b>	8.71	10.76	8.28	10.01	9.78	8.34	10.38
Warehousemen	<b>7.94</b>	9.03	9.85	10.96	10.83	7.02	9.64	13.18
Order Fillers	<b>10.69</b>	9.72	8.50	9.51	8.93	10.75	8.23	NA
Material Handling Laborers	<b>7.16</b>	9.99	10.17	9.59	9.46	10.78	6.87	11.91
Guards	<b>6.90</b>	5.58	6.06	5.33	6.02	5.35	5.60	6.29
Janitors, Porters, Cleaners	<b>5.99</b>	8.79	4.76	4.58	6.41	5.24	4.13	9.01

NA - Not Available

Source: LIRPB based on data from the U.S. Labor Department



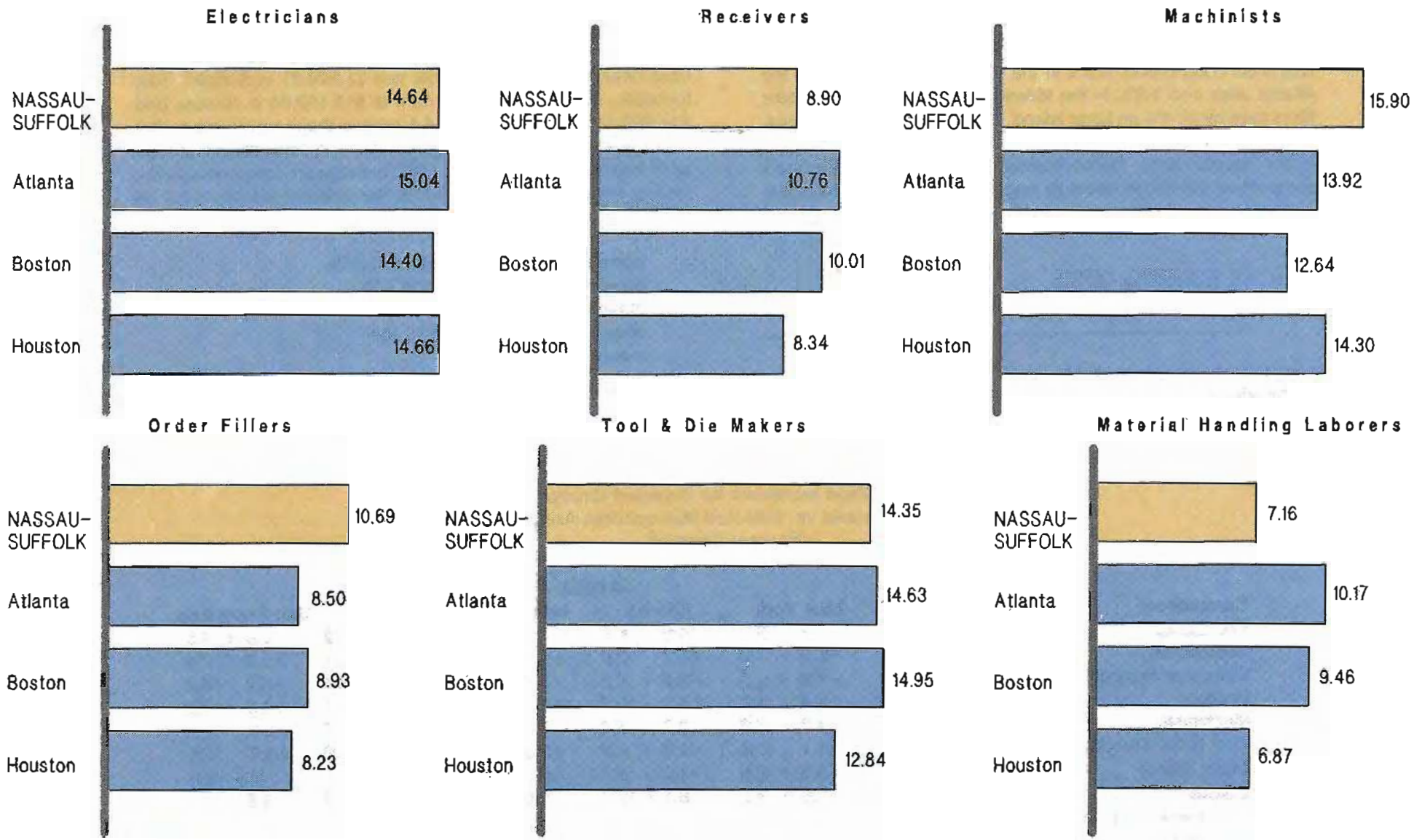
**Figure 4.1**  
**AVERAGE WEEKLY EARNINGS FOR SELECTED PROFESSIONAL,**  
**TECHNICAL AND CLERICAL OCCUPATIONS, 1987**  
**(Dollars)**



Source: U.S. Department of Labor, Bureau of Labor Statistics



**Figure 4.2**  
**AVERAGE HOURLY EARNINGS FOR SELECTED BLUE-COLLAR OCCUPATIONS, 1987**  
**(Dollars)**



Source: U.S. Department of Labor, Bureau of Labor Statistics



For computer programmers, the 1985-87 increase was 14.3% on Long Island as compared with 10.3% in the New York region, 7.0% in the Atlanta area, 6.7% in the Milwaukee area and 6.5% in the Houston area. For machinists, the increase was 12.6% on Long Island as compared with 11.3% in the New York region and 2.8% in the Milwaukee area. For tool and die makers, the increase was 15.2% on Long Island, 6.9% in the New York area, 6.8% in the Atlanta area and 3.8% in the Milwaukee area. Wages for order fillers rose by 37.4% on Long Island, 13.8% in the New York area, 14.1% in the Atlanta area, 16.8% in the Milwaukee area and 19.8% in the Houston area. These findings suggest that Long Island's competitive position in terms of wage costs has begun to deteriorate.

## RELATIVE HOUSING COSTS

Long Island is characterized by relatively high housing costs. The juxtaposition between wages and housing costs suggests that many of the occupational groups that are vital to Long Island's

defense industry cannot afford to live here. In August, 1987, the median price of a **used** home was \$191,000 in Nassau and \$155,000 in Suffolk. Assuming a 10% downpayment, an interest rate of 10% and a 30-year conventional mortgage, monthly payments to amortize the mortgage on a median-priced home would have been \$1,508.55 in Nassau and \$1,224.21 in Suffolk<sup>3</sup>. This translates into an annual payment of \$18,102.60 in Nassau and \$14,690.52 in Suffolk. Table 4.3 relates these payments to the average annual bi-county wage for selected occupational groups as of August, 1987. In August, 1987, average annual gross salaries for key occupational groups within the defense industry were as follows:

computer systems analysts, \$39,078  
 computer programmers, \$29,510  
 drafters, \$24,466  
 electronics technicians, \$21,164  
 machinists, \$33,072  
 tool and die makers, \$29,848

<sup>3</sup>These payments do not include taxes or closing costs.

**Table 4.2**  
**1985-87 Wage Increases for Selected Occupations**  
**Long Island vs. Selected Metropolitan Areas**  
**(Percent Change)**

Occupation	--AREA--					
	Nassau-Suffolk	New York	Atlanta	Milwaukee	Houston	San Francisco
File Clerks	+9.6 +11.3	+0.2 + 3.1	+4.0 - 6.1	+2.0 - 8.9	0.0 + 9.2	+3.8 + 1.5
Secretaries	+6.4 + 6.1	+6.9 + 7.0	+7.7 - 0.6	+4.3 + 1.2	+3.8 + 3.9	+5.2 + 7.9
Computer Programmers	+6.0 + 8.3	+4.9 + 5.3	+5.5 + 1.5	+5.6 + 1.1	+4.4 + 2.1	+5.2 +16.2
Drafters	+5.5 + 5.0	+9.4 + 5.0	+6.2 -10.2	+4.3 + 4.9	-0.4 + 6.1	+4.3 + 4.6
Machinists	+8.4 + 4.2	+4.3 + 7.0	+9.7 - 6.4	+2.4 + 0.4	-2.8 + 4.6	+3.8 N.A.
Tool & Die Makers	+4.5 +10.7	+6.1 + 0.8	+2.6 + 4.2	+2.3 + 1.5	-3.4 - 1.9	+3.7 N.A.
Order Fillers	+4.9 +32.5	+3.2 +10.6	+9.0 + 5.1	+0.7 +16.1	+17.1 + 2.7	N.A. N.A.
Guards	-4.3 +25.2	+3.6 + 3.0	+8.1 +10.4	-5.6 + 2.7	-3.2 - 1.8	+3.9 + 8.6

+9.6 Percent change 1985-86

+9.6 Percent change 1986-87

N.A. - Not Available

Source: LIRPB based on data from the U.S. Labor Department



A computer systems analyst purchasing a median-priced used home in Nassau would have needed 46.3% of his or her annual salary just to amortize the mortgage. The median priced Suffolk home would have absorbed 37.6% of that salary. The computer programmer would have needed 61.3% of annual salary to amortize the typical Nassau home and 49.8% to amortize the typical Suffolk home. The draftsman would have needed 74.0% of annual salary for a Nassau home and 60% for a Suffolk home. The electronics technician would have needed 85.5% of annual salary to amortize the mortgage on a median-priced Nassau home and 69.4% for a median-priced Suffolk home. The machinist would have required 54.7% of annual salary for a Nassau home and 44.4% for a Suffolk home. The tool and die maker would have needed 60.6% of annual salary for a Nassau home and 49.2% for a Suffolk home.

Table 4.3 demonstrates the relationship between median used home prices and average annual salaries. In the real world, some buyers would do better and some would do worse. The analysis also ignores the fact that many bi-county households contain at least two wage earners. However, the statistics cast serious doubt

on whether Long Island can continue to attract the occupational groups needed by its defense industry given the current relationship between wage levels and housing costs.

## RELATIVE TAX LEVELS

Although local taxes are generally a small proportion of overall production costs, they are nevertheless a barometer of an area's receptiveness to business firms. Moreover, as competition within the defense industry intensifies, taxes could become a more critical variable in the overall competitive equation.

The U.S. Census Bureau regularly compiles per capita tax information for large counties. The data include local business and personal taxes from all sources. The most recent comparative data pertain to fiscal year 1985. Long Island's tax data have been compared with data for those areas with significant amounts of defense-related employment.

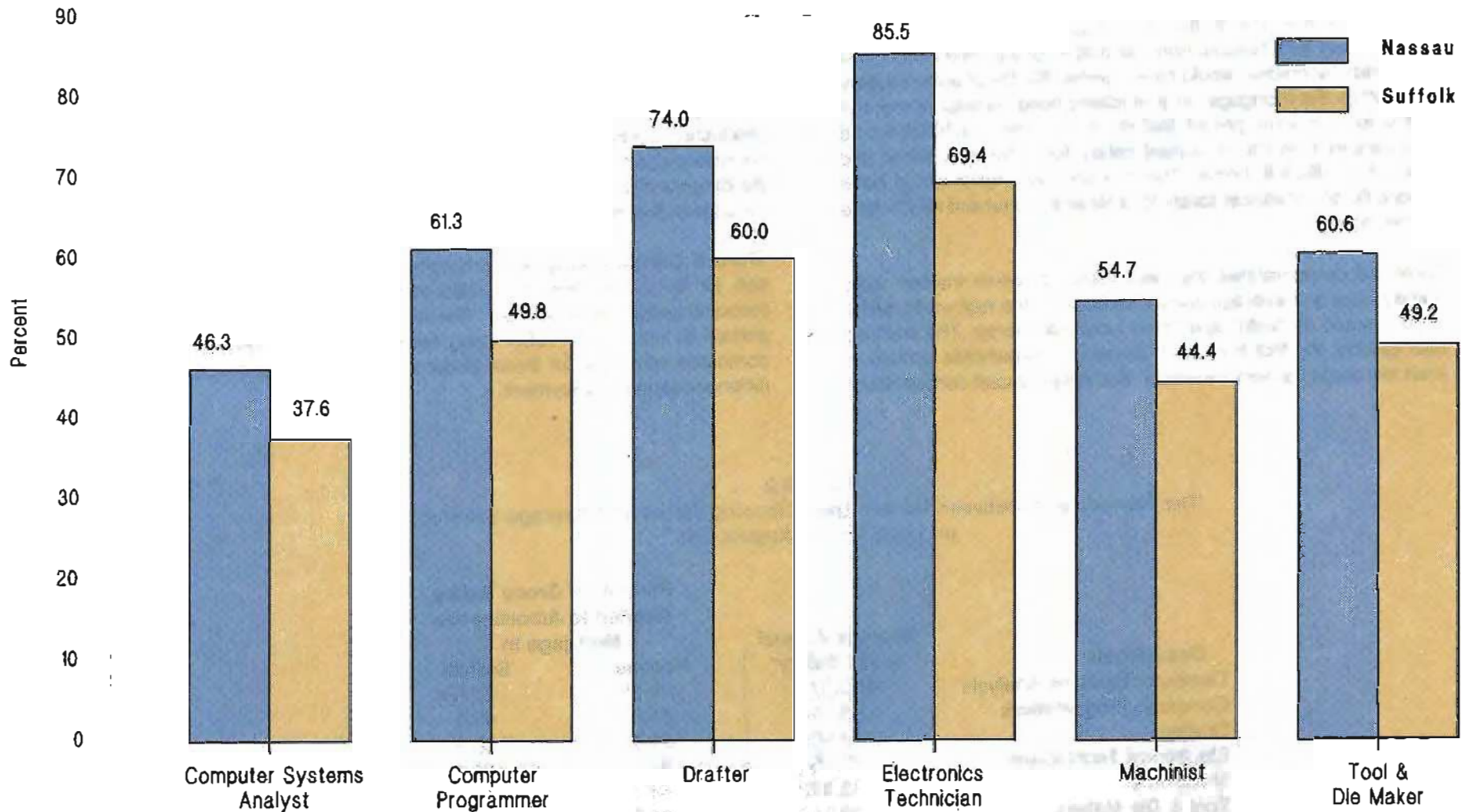
**Table 4.3**  
**The Relationship Between Median Used Housing Prices and Average Salaries**  
**on Long Island, August, 1987**

Occupation	Average Annual Gross Salary*	Percent of Gross Salary Needed to Amortize the Mortgage In	
		Nassau	Suffolk
Computer Systems Analysts	\$39,078	46.3%	37.6%
Computer Programmers	29,510	61.3	49.8
Drafters	24,466	74.0	60.0
Electronics Technicians	21,164	85.5	69.4
Machinists	33,072	54.7	44.4
Tool & Die Makers	29,848	60.6	49.2

\*Based on an August, 1987 U.S. Department of Labor Survey  
Source: Long Island Regional Planning Board



**Figure 4.3**  
**PERCENT OF GROSS SALARY NEEDED TO AMORTIZE THE MORTGAGE**  
**on a TYPICAL LONG ISLAND HOME\*, AUGUST, 1987**  
**(by OCCUPATION)**



Source: Long Island Regional Planning Board

\*Refers to a median-priced USED home in Nassau and Suffolk Counties.  
 A 10% downpayment, a 10% interest rate and a 30-year conventional mortgage are assumed.



In fiscal year 1985, per capita local taxes were \$1,550.47 in Nassau and \$1,253.60 in Suffolk. Comparable per capita taxes were \$837.61 in San Francisco County, California, \$605.03 in Broward County, Florida, \$691.98 in Middlesex County, Massachusetts and \$790.72 in Harris County, Texas. These figures suggest that Long Island defense firms are at a competitive disadvantage vis-a-vis their counterparts located elsewhere. However, the specifics of the public service package also influence an area's competitiveness for defense work. Areas with poor quality schools cannot attract professional and technical workers. In areas where services to property are minimal, firms must provide these services at their own expense and this affects their bottom-line profits. In addition, property taxes are partially offset against the Federal income tax, which lessens their negative impact.

To illustrate these points, it is useful to compare per capita taxes in given areas with per capita educational expenses. Education, like parks and recreation, is considered a *quality of life* expenditure. The statistics indicate that those areas with the highest per capita taxes are also characterized by the highest per capita educational expenditures and vice-versa. In fiscal year 1985, per capita taxes in Harris County, which is located in the Houston area, were only 51% of the level of taxes in Nassau and 63% of the level of taxes in Suffolk. However, per capita spending for education in Harris County was only 58% of comparable expenditures in Nassau and 46% of such spending in Suffolk. Thus, although Nassau and Suffolk are high tax areas, the public services they provide tend to justify those taxes.

**Table 4.4**  
**Per Capita Local Taxes and Per Capita Educational Expenditures**  
**Nassau-Suffolk vs. Selected Metropolitan Counties**

Area and County	Per Capita Taxes	Per Capita Educational Expenditures
<b>Nassau</b>	<b>\$1,550.47</b>	<b>\$1,070.10</b>
<b>Suffolk</b>	<b>1,253.60</b>	<b>1,344.17</b>
<i>New York Area</i>		
New York City	1,484.25	603.77
Westchester, N.Y.	1,461.33	1,014.92
Rockland, N.Y.	1,208.04	1,089.53
Fairfield, Conn.	896.00	605.30
<i>San Francisco Area</i>		
Marin	611.54	558.33
San Francisco	837.61	431.39
San Mateo	716.75	602.15
<i>Ft. Lauderdale Area</i>		
Broward	605.03	461.10
<i>Miami Area</i>		
Dade	648.44	594.07
<i>Boston Area</i>		
Essex	585.62	556.98
Middlesex	691.98	581.48
Suffolk	626.09	494.44
<i>Houston Area</i>		
Harris	790.72	618.27

Source: U.S. Bureau of the Census



## RELATIVE ENERGY COSTS

Like taxes, energy costs are generally a small proportion of overall production costs. However, as competition intensifies, energy costs will become a more important factor in the competitive equation. The most recent statistics on comparative energy costs come from the 1982 Census of Manufactures.

Long Island does not have an energy-intensive manufacturing base. In 1981, the most energy-intensive industries nationally were

chemicals, paper, petroleum and coal products, primary metals and food. Collectively, these industries accounted for 71% of all purchased fuels and electric-energy consumed by the nation's manufacturing sector. However, 1985 employment statistics indicate that only 11.6% of Long Island manufacturing jobs were in these energy-intensive industries. Long Island's manufacturing base is defense oriented. In 1985, 55.3% of Long Island manufacturing jobs were in SIC's 34 through 38: fabricated metal products, electrical and non-electrical machinery, transportation equipment and instruments. In 1981, these industries accounted for only 11.3% of the energy consumed nationally within the manufacturing sector.

**Table 4.5**  
**The Energy-Intensity of Long Island's Manufacturing Base**

Code	Industry	Purchased Fuels & Electric			
		Energy Consumed, 1981 (trillion BTUs)	Percent Distribution	Long Island Employment, 1985	Percent Distribution
20	Food & Kindred Products	913.1	7.9	5,341	2.9
21	Tobacco Manufactures	22.7	0.2	0	0.0
22	Textile Mill Products	292.3	2.5	2,322	1.3
23	Apparel & Other Textiles	61.0	0.5	6,147	3.4
24	Lumber & Wood Products	184.8	1.6	1,889	1.0
25	Furniture & Fixtures	46.2	0.4	3,219	1.8
26	Paper & Allied Products	1,262.2	10.9	4,740	2.6
27	Printing & Publishing	91.1	0.8	17,113	9.3
28	Chemicals & Allied Products	2,630.2	22.8	9,233	5.0
29	Petroleum & Coal Products	1,137.4	9.9	195	0.1
30	Rubber & Plastics	222.7	1.9	6,442	3.5
31	Leather Products	18.4	0.2	635	0.5
32	Stone, Clay & Glass Products	1,077.5	9.3	1,559	0.8
33	Primary Metal Industries	2,240.6	19.4	1,915	1.0
34	Fabricated Metal Products	351.9	3.0	16,380	8.9
35	Machinery, except Electrical	324.8	2.8	14,061	7.7
36	Electric & Electronic Equipment	235.0	2.0	47,012	25.6
37	Transportation Equipment	329.1	2.8	28,326	15.4
38	Instruments & Related Products	78.5	0.7	12,155	6.6
39	Misc. Manufacturing	43.2	0.4	4,726	2.6
	<b>All Industries</b>	<b>11,562.7</b>	<b>100.0</b>	<b>183,410</b>	<b>100.0</b>

Source: LIRPB based on data from the U.S. Bureau of the Census



Although the defense industries are not generally energy intensive, it is useful to ascertain what Long Island defense manufacturers pay for energy relative to their counterparts in other parts of the nation. Once again, the latest comparative data come from the 1982 Census of Manufactures and pertain to calendar year 1981. Long Island has been compared with eleven metropolitan areas ranging from Boston and New York in the northeast to Atlanta in the southeast to Houston and Dallas-Ft. Worth in the southwest to San Francisco, Los Angeles and Seattle in the far west.

In 1981, Long Island manufacturers in the fabricated metals industry paid \$8.50 per million BTUs for purchased fuels and electrical energy. This was 22% above the mean of \$6.95 for the twelve metropolitan areas studied. Energy costs in the industry ranged from a low of \$5.05 per million BTUs in San Francisco to a high of \$9.23 per million BTUs in the adjacent New York-New Jersey metropolitan area. Long Island manufacturers in the non-electrical machinery industry paid \$7.60 per million BTUs for energy. This was actually 8% below the mean of \$8.29 for the twelve areas

studied. Energy costs in this industry ranged from a low of \$4.78 per million BTUs in the Seattle area to a high of \$12.37 in the San Jose area during 1981. Those Long Island manufacturers in the electronic equipment industry paid an average of \$10.18 per million BTUs, 7% above the twelve-area average. The Boston, Los Angeles, New York-New Jersey and San Francisco areas were characterized by higher energy costs than Long Island in this industry. Transportation equipment manufacturers on Long Island -- primarily aerospace firms -- paid \$10.96 per million BTUs for purchased fuels and electricity. This was higher than comparable energy costs in most of the other areas studied. However, the transportation equipment industry includes both aircraft production and automobile production and the census data are not specific enough to develop valid comparisons for this industry. Long Island instrument manufacturers paid an average of \$9.40 per million BTUs in 1981, 2% above the average for the metropolitan areas studied. Energy costs for this industry ranged from a low of \$5.50 per million BTUs in the Denver area to a high of \$14.00 in the San Francisco area.

**Table 4.6**  
**Cost Per Million BTUs of Purchased Fuels and Electricity, 1981**  
**Nassau-Suffolk vs. Selected Metropolitan Areas**  
**Defense-Related Industries**

<b>Area</b>	<b>Fabricated Metal Products</b>	<b>Machinery, Except Electrical</b>	<b>Electric &amp; Electronic Equipment</b>	<b>Transportation Equipment</b>	<b>Instruments</b>
<b>Nassau-Suffolk</b>	<b>\$8.50</b>	<b>\$7.60</b>	<b>\$10.18</b>	<b>\$10.96</b>	<b>\$9.40</b>
Atlanta	6.00	6.63	7.40	6.48	8.00
Boston	7.96	8.57	12.11	11.72	9.25
Dallas-Ft. Worth	6.14	6.50	8.02	6.30	6.50
Denver	5.48	10.86	8.12	5.92	5.50
Houston	6.16	6.47	9.40	6.25	10.00
San Jose	8.22	12.37	10.00	11.59	8.57
Los Angeles	8.21	9.57	13.88	10.99	12.08
New York-New Jersey	9.23	8.94	11.47	11.35	9.67
Phoenix	7.17	11.80	8.17	N.A.	8.00
San Francisco	5.05	5.41	10.67	9.83	14.00
Seattle	5.25	4.78	4.25	4.41	N.A.
<b>MEAN</b>	<b>6.95</b>	<b>8.29</b>	<b>9.47</b>	<b>8.71</b>	<b>9.18</b>

N.A. - Not Available

Source: LIRPB based on data from the U.S. Bureau of the Census



It is apparent from the foregoing statistics that Long Island energy costs in the defense-related industries were at the high end of the spectrum in 1981 and the energy-cost gap may have worsened since that time.

The recent agreement between LILCO and New York State will result in even higher energy costs on Long Island. Under the agreement, New York State will dismantle the Shoreham Nuclear Power Station and taxpayers will share the cost of abandoning the plant. As part of the agreement, LILCO has received permission to recover \$3.6 billion of Shoreham's cost from its customers over a period of forty years. Annual rate increases of 5% are guaranteed for the next three years. In addition, the agreement establishes *target rate* increases of 5% annually for seven more years. The higher energy costs will affect consumers and businesses alike.

## WORKER PRODUCTIVITY

Some of Long Island's competitive disadvantages in terms of energy costs, taxes, and housing costs could be offset by unusually strong worker productivity. This section measures the productivity of Long Island's defense industry workforce as of 1982. It is based on information from the 1982 Census of Manufactures. Value added per dollar of production worker wages has been used as the yardstick for measuring productivity.

In non-electrical machinery, the value added per dollar of wages averaged \$3.65 on Long Island. This was 7% below the mean of \$3.92 for some ten areas studied. By way of comparison, value added per dollar of wages in this industry averaged \$5.04 in California and \$5.49 in Massachusetts. However, the Long Island workforce outperformed the workforce in other areas in two segments of the industry: metalworking and general industry machinery. Value added per dollar of wages in metal working machinery averaged \$3.88 on Long Island, one-third higher than the ten-area mean of \$2.93. Worker productivity in this industry was significantly higher on Long Island than in any other area studied. The ratio of value added to wages in general industry machinery averaged \$4.10 on Long Island, 9% above the nine-area mean of \$3.76. In this industry, Long Island workers outperformed those in the other states studied with the exception of California.

**Table 4.7**  
**Value Added Per Dollar of Production Worker Wages, 1982**  
**Long Island vs. Selected Areas**  
**Non-Electrical Machinery**

Area	SIC 35 Non-Electrical Machinery	SIC 354 Metalworking Machinery	SIC 356 General Industry Machinery
<b>Nassau-Suffolk</b>	<b>\$3.65</b>	<b>\$3.88</b>	<b>\$4.10</b>
Union County, N.J.	3.45	2.80	N.A.
California	5.04	2.67	4.41
Indiana	3.08	2.32	3.61
Illinois	3.56	2.88	3.85
Massachusetts	5.49	2.93	3.72
Michigan	2.92	2.66	3.43
Ohio	3.24	3.01	3.29
Pennsylvania	3.71	2.92	3.77
Texas	5.01	3.21	3.70
<b>MEAN</b>	<b>3.92</b>	<b>2.93</b>	<b>3.76</b>

N.A.-Not Available

Source: LIRPB based on data from the U.S. Bureau of the Census

Long Island worker productivity in the electric and electronic equipment industry was below comparable worker productivity in California and Texas, where some of Long Island's principal competitors are located. In 1982, value added per dollar of wages in this industry averaged \$4.28 on Long Island, \$5.09 in California and \$5.15 in Texas. However, Long Island worker productivity in this industry exceeded that of Westchester County, New York and the State of Massachusetts. Value added per dollar of wages averaged only \$4.00 in Massachusetts and \$3.82 in Westchester County. In the communications segment of the industry, the ratio of value added to production worker wages was \$4.21 on Long Island, \$5.43 in California, \$5.17 in Texas and \$4.04 in Massachusetts. In electronic components, the ratio of value added to wages was \$4.62 on Long Island, \$4.84 in California, \$5.59 in Texas and \$3.72 in Massachusetts.



**Table 4.8**  
**Value Added Per Dollar of Production Worker Wages, 1982**  
**Long Island vs. Selected Areas**  
**Electric and Electronic Equipment**

Area	SIC 36 Electrical & Electronic Equipment	SIC 366 Communications Equipment	SIC 367 Electronic Components
<b>Nassau-Suffolk</b>	<b>\$4.28</b>	<b>\$4.21</b>	<b>\$4.62</b>
Westchester, N.Y.	3.82	N.A.	N.A.
California	5.09	5.43	4.84
Texas	5.15	5.17	5.59
Massachusetts	4.00	4.04	3.72
<b>MEAN</b>	<b>4.47</b>	<b>4.71</b>	<b>4.69</b>

N.A.-Not Available

Source: LIRPB based on data from the U.S. Bureau of the Census

In instruments, value added per dollar of wages averaged \$4.89 on Long Island, \$5.51 in Massachusetts, \$5.38 in California and \$4.86 in New Jersey. In the measuring and controlling devices segment of the industry, the ratio of value added to wages was only \$4.75 on Long Island as compared with \$5.80 in Massachusetts, \$5.18 in California and \$5.38 in New Jersey. However, Long Island workers outperformed workers in these states in engineering and scientific instruments. In this segment of the industry, the ratio of value added to wages was \$5.12 on Long Island, \$3.63 in Massachusetts, \$5.06 in California and \$3.22 in New Jersey.

Productivity data for the aircraft and parts industry are not available for Long Island.<sup>4</sup> This information is, however, available for New York State as a whole. Since the preponderance of aircraft production within the state occurs on Long Island, the state productivity figures are a reasonable indicator of worker productivity on Long Island. In the aircraft and parts industry the ratio of value added to wages in New York State averaged \$4.78 in 1982. This level of productivity was surpassed only by workers in Florida, where the ratio was \$5.66, and Ohio, where the ratio was \$5.23. Industry productivity in New York State exceeded comparable productivity in California, Texas, Connecticut and Kansas, states which contain a relatively large number of jobs in the aircraft and parts industry.

<sup>4</sup>This would violate census disclosure rules because of the small number of aircraft producers on Long Island. With such a small number of firms, analysts could conceivably isolate data for any one firm.

**Table 4.9**  
**Value Added Per Dollar of Production Worker Wages, 1982**  
**Long Island vs. Selected Areas, Instruments**

Area	SIC 38 Instruments	SIC 382 Measuring & Controlling Devices	SIC 3811 Engineering & Scientific Instruments
<b>Nassau-Suffolk</b>	<b>\$4.89</b>	<b>\$4.75</b>	<b>\$5.12</b>
Massachusetts	5.51	5.80	3.63
California	5.38	5.18	5.06
New Jersey	4.86	5.38	3.22
<b>MEAN</b>	<b>5.16</b>	<b>5.28</b>	<b>4.26</b>

Source: LIRPB based on data from the U.S. Bureau of the Census

**Table 4.10**  
**Value Added Per Dollar of Production Worker Wages, 1982**  
**New York State vs. Selected States**  
**Aircraft and Parts**

State	SIC 372 Aircraft and Parts
<b>New York</b>	<b>\$4.78</b>
California	4.34
Texas	4.35
Florida	5.66
Connecticut	3.64
Kansas	3.84
Ohio	5.23
<b>MEAN</b>	<b>4.55</b>

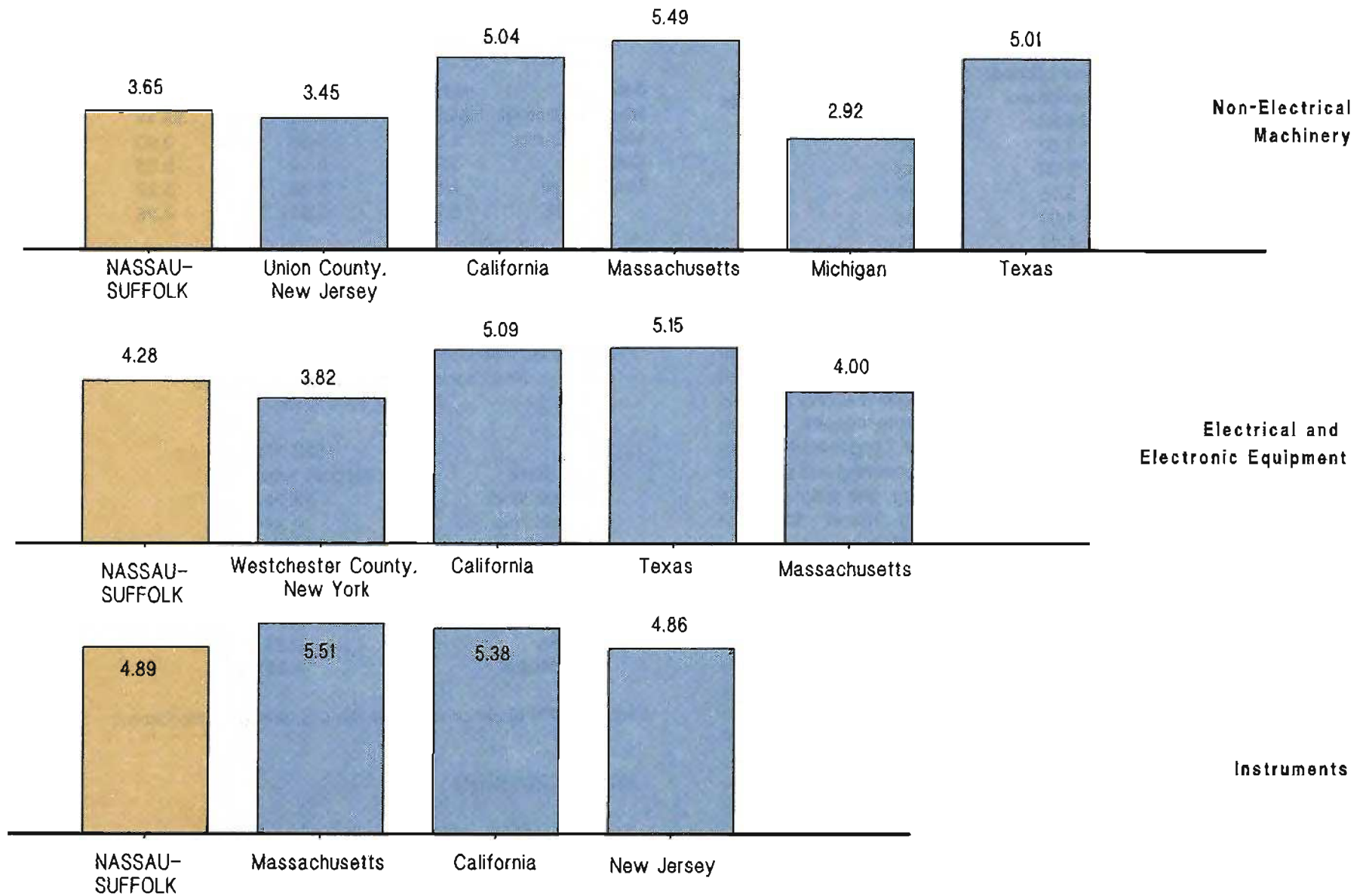
Source: LIRPB based on data from the U.S. Bureau of the Census

## CAPITAL SPENDING

The foregoing figures suggest that the productivity of Long Island defense workers is relatively high. Nevertheless, some improvement is warranted to offset the relatively high costs of energy, housing and taxes on Long Island.



**Figure 4.4**  
**WORKER PRODUCTIVITY IN SELECTED DEFENSE INDUSTRIES, 1982**  
**NASSAU-SUFFOLK vs. COMPETING STATES and AREAS**  
**(VALUE ADDED PER DOLLAR of PRODUCTION WORKER WAGES in DOLLARS)**



Source: Long Island Regional Planning Board



One means of boosting worker productivity is to invest additional capital for each production worker. Aging plant and equipment goes hand-in-hand with lower productivity. As of 1982, new capital investment per production worker in Long Island's defense industries was generally lower than in other large manufacturing states.<sup>5</sup> The ratio of new capital investment per production worker on Long Island has been contrasted with comparable ratios in eleven large manufacturing states. In fabricated metals, new capital investment per production worker averaged \$2,303 on Long Island. This was almost 31% below the twelve-area mean of \$3,325. In non-electrical machinery, new capital spending per production worker averaged \$3,957, 34% below the twelve-area mean of \$6,022. In the electric and electronic equipment industry, new capital spending per production worker averaged \$4,041, 27% below the twelve-area average. In instruments, the ratio for Long Island was \$3,271, 28% below the twelve-area mean.

Capital spending figures for the aircraft and parts industry are available only on a statewide basis. However, once again, most aircraft production within New York State is located on Long Island. For purposes of analysis, New York State was compared with six other states that are heavily involved in aircraft production. In 1982, new capital investment per production worker in the aircraft and parts industry in New York State, \$4,908, was more than 8% below the mean ratio for the seven states studied. New capital investment per production worker in California, \$7,555, was the highest of any state studied.

<sup>5</sup>These differences must be interpreted with caution, however, because different areas have a different mix of subindustries within major industry groups and each subindustry may have different capital requirements.

**Table 4.11**  
**New Capital Investment Per Production Worker in Selected Defense-Related Industries**  
**Nassau-Suffolk vs. Selected States, 1982**

<b>Area</b>	<b>SIC 34 Fabricated Metals</b>	<b>SIC 35 Non-Electrical Machinery</b>	<b>SIC 36 Electric &amp; Electronic Equipment</b>	<b>SIC 38 Instruments</b>
<b>Nassau-Suffolk</b>	<b>\$2,303</b>	<b>\$3,957</b>	<b>\$4,041</b>	<b>\$3,271</b>
California	3,419	9,380	9,753	5,974
New Jersey	2,769	3,763	3,344	4,272
Texas	4,919	12,148	6,883	4,949
Florida	2,563	9,457	7,860	3,232
New York	3,883	6,235	7,834	9,621
Michigan	3,424	4,102	5,250	3,253
Connecticut	2,917	4,372	4,436	5,844
Kansas	2,661	4,259	3,239	2,048
Ohio	3,853	3,669	3,602	3,063
Pennsylvania	3,387	4,163	5,691	3,885
Massachusetts	3,797	6,765	4,348	4,989
<b>MEAN</b>	<b>3,325</b>	<b>6,023</b>	<b>5,523</b>	<b>4,533</b>

Source: LIRPB based on data from the U.S. Bureau of the Census



**Table 4.12**  
**New Capital Investment Per Production Worker in Selected**  
**States, 1982, Aircraft and Parts**

<b>State</b>	<b>SIC 372 Aircraft and Parts</b>
<b>New York</b>	<b>\$4,908</b>
Texas	\$2,848
Florida	\$5,946
Kansas	\$5,735
California	\$7,555
Ohio	\$5,295
Connecticut	\$5,233
<b>MEAN</b>	<b>\$5,360</b>

Source: LIRPB based on data from the U.S. Bureau of the Census

While additional capital investment in plant facilities and equipment may be desirable, Long Island defense contractors may find themselves in a catch-22 situation with respect to investment capital. New Defense Department procurement policies and rules are likely to limit profits within the industry, thereby making it more difficult to generate investment capital internally. At the same time, the growing imbalance between risks and returns in the industry may discourage the financial community from making long-term loans to defense firms at reasonable rates of interest.

## CONCLUSIONS

### Long Island's Competitive Position For Defense Production

As of mid-1987, Long Island wage levels were generally similar to wage levels in other metropolitan areas for the same occupation. In fact, Long Island wages were below those in sunbelt areas like Houston and San Francisco for a broad spectrum of clerical, professional and technical occupations. The Houston and San Francisco areas also specialize in defense-related production. The problem for Long Island is that local housing costs have moved completely out-of-line with local salaries. The wages of those mid-level professional and technical workers who are essential to the functioning and future competitiveness of Long Island's aerospace industry are no longer adequate to support median-priced used homes in Nassau and Suffolk Counties. This means that Long Island defense firms will find it increasingly difficult to attract the workers they need without significant wage increases. Wages have already started to rise on Long Island in response to the tight labor market. Further wage increases would erode the competitive position of Long Island defense firms vis-a-vis defense firms located elsewhere.

Long Island defense firms are also at a competitive disadvantage by virtue of relatively high local taxes and energy costs. And, although the productivity of Long Island defense workers is relatively high, even higher levels of future productivity will be needed to offset the area's other cost disadvantages.



## CHAPTER 5...

# LONG ISLAND'S LEADING DEFENSE FIRMS: PROGRAMS AND FINANCES

This chapter analyzes the current and potential programs and the financial condition of several of Long Island's major defense firms. It evaluates the likely future program direction and competitive position of each of these firms.

### The GRUMMAN CORPORATION

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Grumman is the largest defense employer on Long Island. As such, the future program decisions made by the firm's management will profoundly affect Long Island's economic future and the future of its aerospace industry.

**Corporate Organization.** The Grumman Corporation is organized around four industry segments: aerospace, electronic systems, special purpose vehicles and information and other services. Its aerospace activities include the design and production of military aircraft, space systems and commercial aircraft components and subassemblies as well as the modernization or conversion of previously completed aircraft. Electronic systems include the design, manufacture and integration of sophisticated electronics for aircraft as well as computerized test equipment and other defense-related products, such as airborne surveillance systems. Its special purpose vehicle business includes the fabrication and sale of aluminum truck bodies, fire trucks, aluminum boats and canoes and vehicles for the U.S. Postal Service. Grumman's information services business includes both electronic data processing services and certain technical services. The latter include preparing the space shuttle for successive flights, servicing and maintaining flight simulators and trainers and supporting Grumman aircraft. This distribution of activity represents a restructuring of the firm which became effective on January 1, 1986.



The Grumman Corporation is organized into seven operating divisions. These divisions and their respective functions are as follows:

Division	Function
Aerostructures	Aircraft subcontracting work
Aircraft Systems	Airplane manufacturing
Data Systems	Computer services
Electronic Systems	Aerospace & non-aerospace equipment, primarily automatic test equipment
St. Augustine	Aircraft refurbishing
Technical Services	Servicing the space shuttle between flights
Vehicle & Marine	Truck bodies, boats, yachts

In January, 1988, Grumman established an office of corporate technology to oversee research, development and engineering for its seven operating divisions. The new unit, located in the Corporation's Bethpage headquarters, will provide corporate oversight of the firm's technological assets.

**Location of Facilities.** Grumman maintains facilities on Long Island and in eleven states. The Long Island facilities and their respective functions are as follows:

Location	Function
Bethpage	Manufacture of aircraft detail parts; assembly of aircraft
Calverton	Final assembly and flight testing of aircraft
Bohemia	Product development center for commercial products; design, development & manufacture of cockpit air crew trainees
Syosset/Woodbury	Grumman Data Systems computer facility
Melville	Program management offices
Great River	Manufacture of electronic equipment & support systems

Grumman has recently spent more than \$600 million on new buildings, tools and equipment for its Long Island facilities. Grumman is also building a \$64 million cogeneration power plant, which will provide electricity for its Bethpage operations by July, 1989.

Grumman maintains relatively extensive out-of-state facilities and has announced that many future growth activities will be located off Long Island because of the high cost of doing business here.

Thus, it is conducting the J-Stars program in Melbourne, Florida, building mail trucks for the postal service in Montgomery, Pennsylvania and assisting NASA in managing construction of the space station in Reston, Virginia. Grumman also recently announced that it is building a \$10 million facility in Houston, where it will work on NASA's space station and manufacture parts for U.S. and foreign military aircraft.

Grumman's out-of-state facilities and their current functions are as follows:

Location	Functions
Mayfield, Pa.	Manufacture of trucks
Montgomery, Pa.	Manufacture of postal vehicles
Plainsboro, N.J.	Manufacture of gallium arsenide microchips for integrated circuits
Salisbury, Md.	Manufacture of electronic equipment
Glen Arm, Md.	Machining operations to build bulkheads and wing skins for Grumman planes
Reston, Va.	Assisting NASA in managing construction of space station
Roanoke, Va.	Manufacture of fire trucks
Milledgeville, Ga.	Manufacture of advanced non-metallic materials for aircraft parts
Huntsville, Ala.	NASA support operations for rocket test and analysis
St. Augustine, Fla.	Modification and retrofit of aircraft for the Navy, foreign governments and commercial customers
Melbourne, Fla.	Manufacture of electronic systems for J-Stars Program
Stuart, Fla.	Manufacture of aircraft parts; modification of aircraft
Sturgis, Mich.	Manufacture of aluminum trucks
Arkadelphia, Ark.	Manufacture of Grumman boats
Houston, Texas	Manufacture of aircraft wiring, bomb proof shelters for computer equipment, C-2 and E2C subassemblies
Sherman, Texas	Manufacture of trucks
Irvine, Calif.	Manufacture of space satellite components and optical systems
Tulare, Calif.	Manufacture of trucks
Pittsburg, Calif.	Manufacture of fire trucks



**Current and Future Programs.** Grumman's current and future markets, products and services have been influenced by several recent developments. These include the recent loss of a contract to develop the Advanced Tactical Aircraft (ATA), the 1987 award of a Program Support Contract to help NASA manage development of the Manned Space Station and the 1985 Joint STARS contract.

The Grumman-Northrop team lost the opportunity to build the Navy's next generation attack plane. Instead, the Navy announced that it had chosen McDonnell Douglas Corporation and General Dynamics Corporation to build the Advanced Tactical Aircraft, a project that could be worth as much as \$45 billion. The new plane will replace the A-6 attack plane as the Navy's prime carrier-based bomber. This was a setback for Grumman, which has produced carrier-based aircraft for the Navy since the 1920s. The contract loss means that Grumman is no longer a prime contractor on a major new aircraft program. The contract loss, which comes at a time when many of Grumman's current aircraft programs are becoming *middle aged*, means that the firm's military aircraft business, which accounted for 70% of total sales in 1985, will diminish as a proportion of the firm's overall business. However, there is a possibility that the revelations emanating from the current defense scandal will prompt the reopening of the bidding process for the ATA.

Grumman currently produces the F-14 Tomcat, the EA-6B Prowler, the A-6 Intruder, the C-2 Greyhound and the E2C Hawkeye. The E2C is being upgraded with a new electronics system. However, the Defense Resources Board recently recommended that funding for any new EA-6Bs be ended in 1990. Grumman's A-6 program, which began in the early 1960s, was scheduled to end in 1989 with the purchase of eleven A-6E's in fiscal 1987 and an additional ten A-6E's in fiscal 1988. In June, 1988, the Defense Department announced plans to purchase ten additional A-6Es, which would extend the program through 1991. After that, funding is uncertain. Congressional critics cite the aircraft's vulnerability because of its subsonic speed and large radar image. However, unforeseen technical problems associated with development of the ATA may push A-6 production well into the 1990s. The final C-2 Greyhounds, a transport plane, are to be built in 1989 under a \$678 million contract and the program will then be terminated. Grumman is also upgrading the F-14. It will build 38 F-14A (PLUS) fighters for the Navy.

Deliveries of the plane started in 1987 and will end in 1990. By 1990, deliveries of the upgraded F-14D version are slated to begin. The company hopes to build 127 F-14Ds, which will contain new engines and electronic countermeasures capability as well as new radar and digital avionics. As many as 60 existing F-14s will be modified annually to include the new equipment. However, Grumman will have to compete with other aerospace firms for this business.

There has been speculation that Grumman will eventually drop out of the airframe business as a result of the loss of the ATA. This does not appear to be likely. Grumman is continuing to upgrade the F-14. The Company is attempting to design a replacement for its Navy E-2C Hawkeye electronics radar plane. It has a preliminary design contract with the Air Force for the next generation of Airborne Early Warning System airplanes. It is also undertaking design studies to develop an advanced short takeoff and landing aircraft that would provide air support for combat troops. In addition, Grumman provides aircraft components and major subassemblies to other aircraft manufacturers. It is also pursuing foreign sales of military aircraft and aircraft systems. In 1987, the company won three contracts totaling \$245 million to provide a modern fire control system for the People's Republic of China F-8 aircraft. This represents the largest military program between the U.S. and China. Grumman has become the first U.S. aerospace company to establish a presence in China under a U.S.-approved foreign military sales program. The ability of Grumman to sustain production of its existing aircraft, to act as a subcontractor to other aircraft manufacturers and to successfully market their military aircraft abroad will determine the extent to which Grumman can maintain its aircraft capability on Long Island. As of 1987, 3,200 workers were employed on the F-14 program, 3,000 on the A-6, 2,000 on the EA-6B, 2,300 on the E-2C and 700 on the EA-6B.

Grumman's ability to diversify away from Navy contracts will also be critical. The firm received government awards totaling \$2.40 billion in fiscal 1984, \$2.73 billion in fiscal 1985, \$2.98 billion in fiscal 1986 and \$2.25 billion in fiscal 1987. The preponderance of these awards came from the Navy.



**Table 5.1**  
**Scheduled DOD Orders for Grumman Aircraft, Fiscal 1987-89**  
**(\$ Millions)**

Aircraft	Fy 1987		Fy 1988		Fy 1989	
	No.	Amount	No.	Amount	No.	Amount
F-14 A/D Tomcat	15	640.0	12	751.1	12	879.8
EA-6B Prowler	12	411.9	12	453.9	9	491.8
A-6 Intruder	11	252.3	10	445.9	0**	0
C-2 Greyhound	9	98.2	0	0	0	0
E2C Hawkeye	10	431.0	6	379.2	6	338.0
<b>Total</b>	<b>57</b>	<b>1,833.4</b>	<b>40</b>	<b>2,030.1</b>	<b>27</b>	<b>1,709.6</b>
<b>Aircraft</b>			<b>Total Value*</b>			
F-14 A/D Tomcat		958.6		987.4		1,077.7
EA-6B Prowler		476.4		523.7		537.4
A-6 Intruder		470.4		678.9		12.0
C-2 Greyhound		103.4		3.5		0.3
E2C Hawkeye		490.0		415.8		377.9
<b>Total</b>		<b>2,498.8</b>		<b>2,609.3</b>		<b>2,005.3</b>

\*Includes spare parts, RDT & E and military construction

\*\*The Defense Department recently announced the acquisition of 10 additional aircraft

Source: U.S. Department of Defense

**Table 5.2**  
**Government Awards to the Grumman Corporation**  
**by Fiscal Year, (\$000)**

Service	84	85	86	87
Air Force	141,809	84,799	263,403	216,356
Army	19,057	28,126	35,454	11,635
Dept. of Energy	465	850	74	215
NASA	10,261	9,514	8,525	8,018
Navy	2,229,207	2,607,694	2,671,922	2,011,477
Corps. of Engineers	2,285	3,110	1,846	4,286
Other	0	0	0	0
<b>Grand Total</b>	<b>2,403,084</b>	<b>2,734,093</b>	<b>2,981,224</b>	<b>2,251,987</b>

Source: DMS Contract Awards. File 588 DIALOG



However, diversification is already occurring. Grumman does not regard the loss of the ATA as a major blow to its basic business strategy. Its objective, as stated in its 1987 annual report, is "to sustain and grow our aircraft design, manufacturing, modification and subcontracting business as we continue expanding beyond the systems aircraft, which has become a Grumman specialty, into the integration of complex systems for other requirements."

Grumman is moving forcefully into the systems integration business. It won a 1987 contract to help NASA manage the development of the manned space station. The contract is the largest systems integration assignment that any company has ever received. Under the \$841-million contract, some 1,250 engineers and technicians will work at a new support division in Reston, Virginia where NASA will have its space station operations. Grumman will oversee the work of the four aerospace companies -- McDonnell Douglas, Boeing, General Electric and the Rocketdyne Division of Rockwell International -- that have been chosen by NASA to build parts of the space station. Grumman will be in charge of integrating all of the systems and of assuring that the space station works with the space vehicles and systems being developed by Japan, Canada, a consortium of European firms and other companies in the United States. Grumman will be assisted in these tasks by Ford Aerospace and Communications Corporation of Detroit, Booz, Allen and Hamilton of Bethesda, Maryland, Wyle Laboratories, Barrios Technologies and the Center for Advanced Technology, Inc. The space station is scheduled to go into orbit in the mid-1990s.

Grumman is also a member of the Boeing-led team that won a contract to build the space station's crew quarters. The project is worth about \$50 million to the Grumman Corporation. Grumman has also won a \$1.5 million contract for the preliminary design of a space station robot. The robot will assist astronauts as they build the station in space.

Grumman's other major systems integration assignment is to develop Joint STARS, a flying command post capable of managing an entire battlefield. The \$657 million Joint STARS contract was awarded in 1985 and represents Grumman's largest Air Force contract to date. Both the contract with NASA and the Joint STARS contract with the Air Force represent successful attempts by Grumman to diversify from its traditional Navy business.

The Grumman-designed radar for Joint STARS will be put into a military version of the Boeing 707. The system will help detect and locate ground targets and guide aircraft and missiles against armored and support forces. Production of the system is scheduled to begin in 1990. The contract has the potential to produce \$10 billion in revenue for Grumman.

Grumman has committed itself to the growth of the electronics segment of its business. A major electronics systems program is Intermediate Forward Test Equipment (IFTE). IFTE is the Army's next generation of automatic test equipment. It will be used to diagnose the electronics problems of equipment in the field.

Grumman has also moved decisively into the market for special purpose vehicles. It has a \$1.1 billion contract with the U.S. Postal Service to build 99,150 delivery trucks by 1993. The Company has been testing these trucks in the fleets of its commercial customers and believes that there is an important business potential for the product in addition to the postal service contract.

Grumman has a \$20 million contract to build a system to detect missiles in their boost phase, immediately after launch. The Boost Surveillance and Tracking System is part of the Strategic Defense Initiative program. The Army has awarded the Grumman and Martin Marietta Corporations \$4 million contracts to develop robot antitank weapons. Grumman is also participating in a proposal to design machines that can etch super high-speed computer chips with x-rays. These \$50 to \$70 million machines would be sold to semiconductor manufacturers worldwide. Grumman's data systems operations registered 1987 sales of \$290 million of which \$91 million consisted of new and follow-on business. In July, 1988, the Data Systems Division won a \$92 million contract to replace the Air Force's aging computers.

Thus, Grumman is diversifying away from the airframe business, its traditional mainstay, and is moving into electronics, systems integration, special purpose vehicles and information services. It is becoming a high-technology manufacturer, a supplier of airplane parts and defensive electronic equipment to other aerospace firms and a data processing and software company. This has become evident in the shifting composition of Grumman's revenue sources. In 1984, aerospace sales accounted for 78% of total revenues, electronics for 6%, information services for 11% and special purpose vehicles for 5%. It is projected that in 1988, aerospace sales will account for 63% of revenues, electronics for 16%, information services for 12% and special purpose vehicles for 9%.



At the end of 1987, Grumman had a substantial backlog, \$7.9 billion, of booked orders. Of this amount, \$4.5 billion was for Navy jets, \$1 billion for postal service trucks, \$900 million for the NASA space station and \$1.4 billion for commercial airline parts and defense electronics.

**Table 5.3**  
**Proportion of Revenues From Selected Industry Segments**  
**The Grumman Corporation, 1984 vs. 1988**  
**(Percents)**

Industry Segment	1984 (Actual)	1988 (Projected)
Aerospace	78%	63%
Special Purpose Vehicles	5	9
Information Services	11	12
Electronics	6	16
<b>Total Revenues</b>	<b>\$2.6 billion</b>	<b>\$4.3 billion</b>

Source: Prudential-Bache Securities, Inc.

**Table 5.4**  
**Annual Backlog of Booked Orders, 1983-87**  
**The Grumman Corporation**  
**(\$ Billions)**

Year	Amount	Year	Amount
1983	\$4.5	1986	\$6.7
1984	5.0	1987	7.9
1985	5.3		

Source: The Grumman Corporation.

It is clear that Grumman's business orientation is changing. As air-frame production becomes proportionately less important and the emphasis shifts to electronics and systems integration, proportionately more of the Corporation's work is likely to be performed off Long Island.

**Finances.** Grumman's financial condition is characterized by the growing use of debt. The Corporation's long-term debt increased from \$76 million in 1983 to \$643 million in 1987. In 1987, Grumman raised funds totaling \$327.5 million. Of this amount, \$231.4 million, or 71%, came from the issuance of long-term debt. Grumman officials attribute the sharp increase in debt to recent procurement reform policies which have resulted in reduced progress payments.

Some analysts also attribute the growing use of debt to the Company's need to finance growth in new areas such as electronics and special purpose vehicles. As a result of the growing use of debt capital, the Corporation's ratio of debt to total capital increased from 13.2% in 1983 to 50.2% in 1987. The Corporation's debt-to-equity ratio rose from 16.8% in 1983 to 79.2% in 1987. A common rule of thumb is that the debt-to-equity ratio should not exceed 50.0%. Grumman's interest costs have paralleled the changes in long-term debt. Interest expense rose from \$13.2 million in 1983 to \$58.9 million in 1987. It is expected that the increase in debt caused by borrowing for the development of new programs will gradually be reduced as these programs go into production. Analysts suggest that by the early 1990s, long-term debt will level off at about \$550 million.<sup>6</sup>

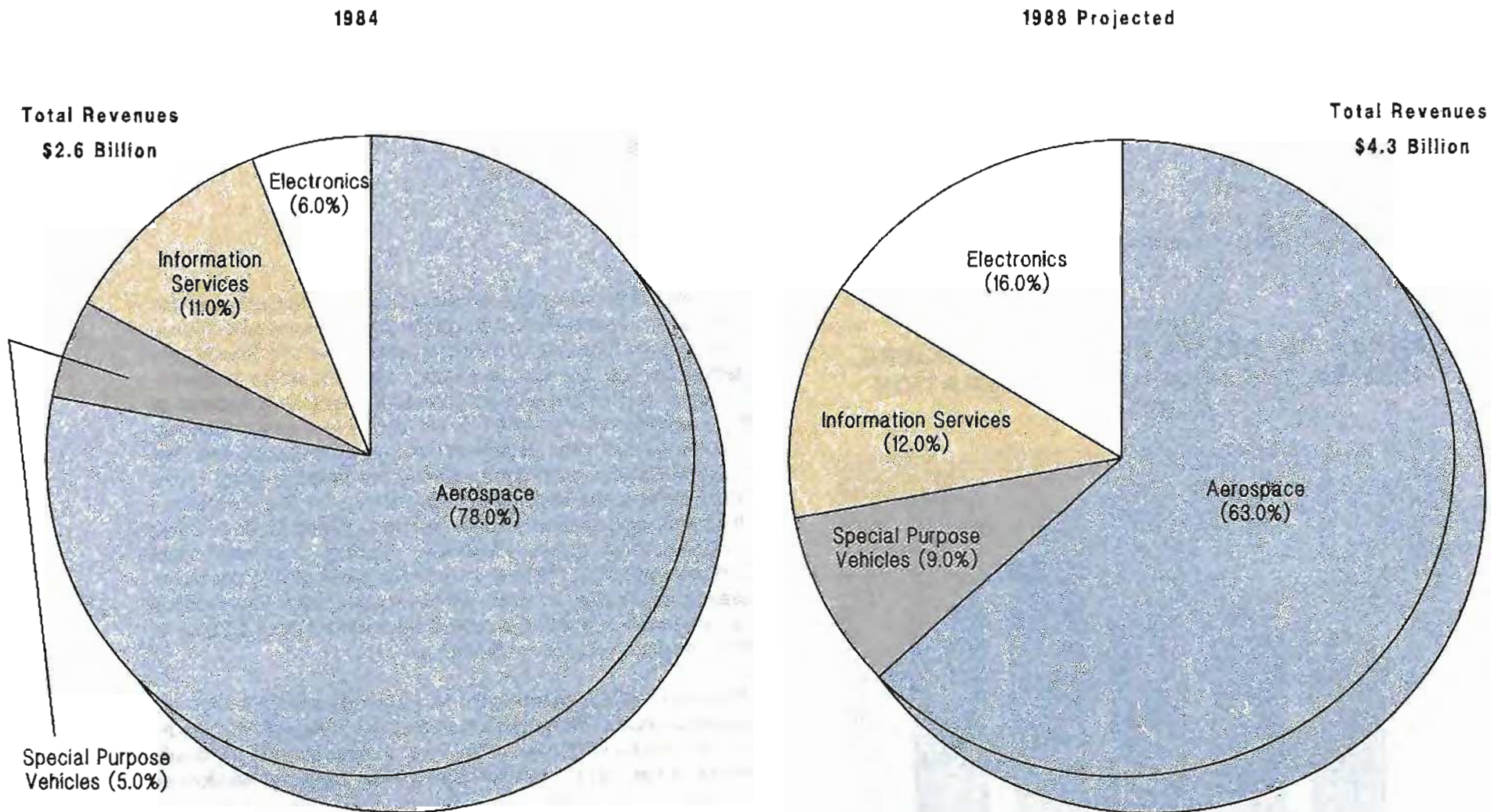
Grumman's sales increased from \$2.06 billion in 1982 to \$3.37 billion in 1987, a gain of almost 64%. However, net income from continuing operations was only \$27 million in 1987, well off its peak of \$111 million in 1983. As a result, the ratio of net income to sales declined from 4.9% in 1983 to 1.1% in 1987. During the same period, earnings per share plummeted from \$3.82 to \$0.67. Declines in net income during 1987 reflect the fact that the Company produced fewer F-14s in 1987 and that it made the transition to an improved model, the F-14D. In addition, two one-time developments pulled profits down. One was the \$40 million settlement of the lawsuits with the New York Metropolitan Transit Authority over flexible buses sold to the Transit Authority in 1979. The settlement caused a \$26.4 million after-tax loss for discontinued operations.

In February, 1988, Grumman and the U.S. Navy reached agreement on a dispute in connection with the F-14D. The agreement caused a \$60 million pre-tax and \$36.6 million after-tax charge to Grumman's 1987 earnings. Conversely, 1987 earnings benefitted from a one-time gain of \$35 million because of a change in the accounting for deferred taxes resulting from the Federal Tax Reform Act of 1986. Grumman's second quarter, 1988 earnings increased 53% over earnings during the second quarter of 1987. The gain reflected increases in deliveries of F-14 fighter jets and mail trucks.

<sup>6</sup>Paul H. Nisbet and Keith A. Patriquin, Prudential-Bache Securities, Inc., *Grumman Corp.* June 2, 1988, pp. 5, 17, 19; Phillip R. Brannon and James P. McFadden, Merrill Lynch Capital Markets, *Grumman Corp.*, April 5, 1988, p.6.



**Figure 5.1**  
**PROPORTION OF REVENUES FROM SELECTED INDUSTRY SEGMENTS**  
**THE GRUMMAN CORPORATION, 1984 vs. 1988**  
**(Percents)**



Source: Prudential - Bache Securities, Inc.



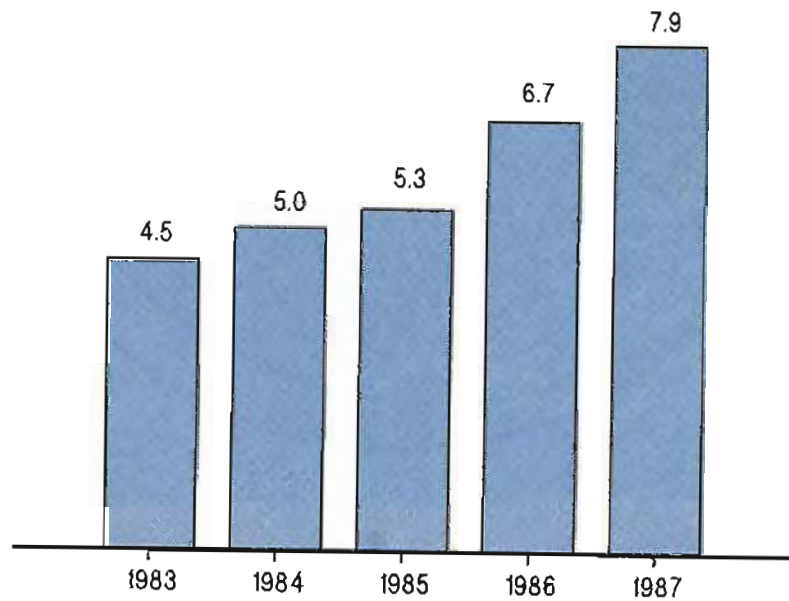
**Table 5.5**  
**Selected Financial Indicators, 1983-87**  
**The Grumman Corporation**  
**(\$ Millions)**

Year	Long-Term Debt	Total Capital	Debt/ Total Capital	Net Income*	Sales	Net Income/ Sales	Earnings/ Share
1983	76	579	13.2	111	2,255	4.9	3.82
1984	249	838	29.7	108	2,604	4.2	3.62
1985	263	933	30.5	82	3,099	2.6	2.65
1986	421	1,248	38.5	79	3,502	2.2	2.32
1987	643	1,545	50.2	27	3,375	1.1	0.67

\*From continuing operations

Source: The Grumman Corporation

**Figure 5.2**  
**ANNUAL BACKLOG OF BOOKED ORDERS,**  
**1983-87; THE GRUMMAN CORPORATION**  
**(\$ Billions)**



Source: The Grumman Corporation

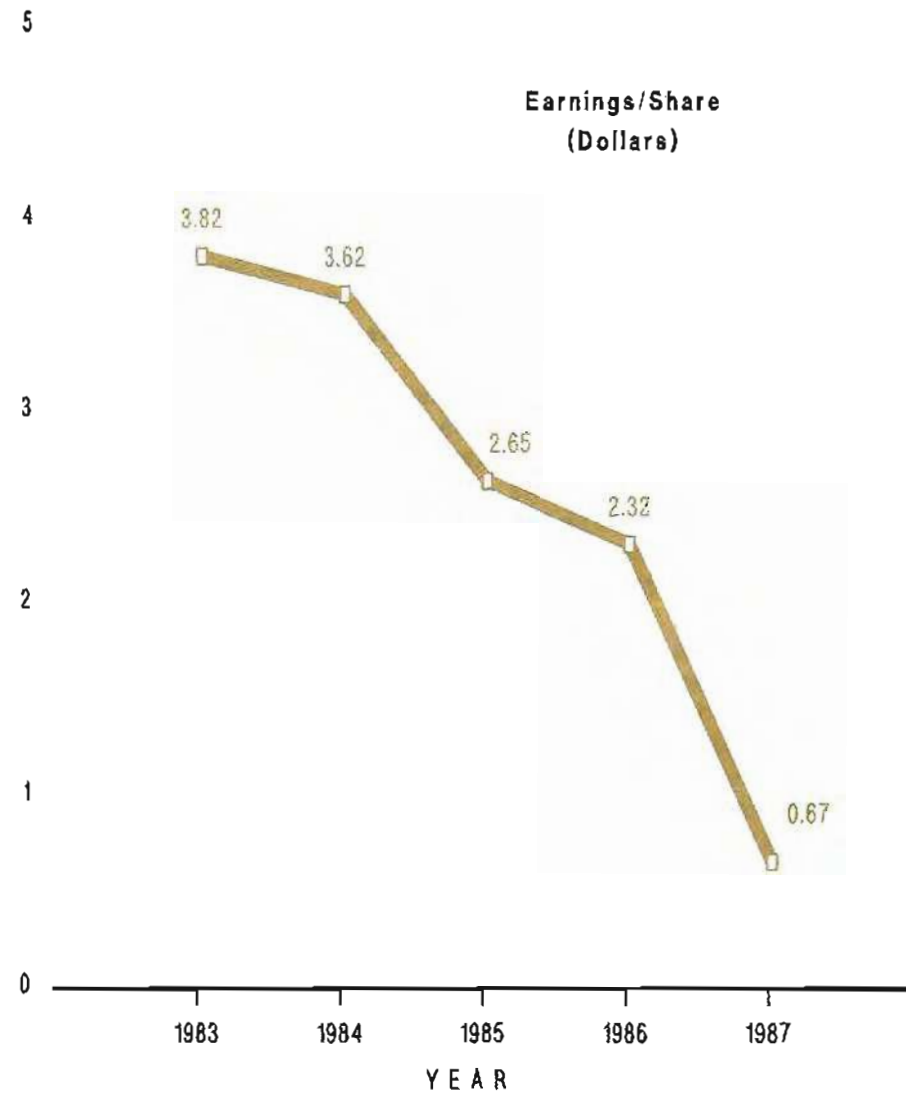
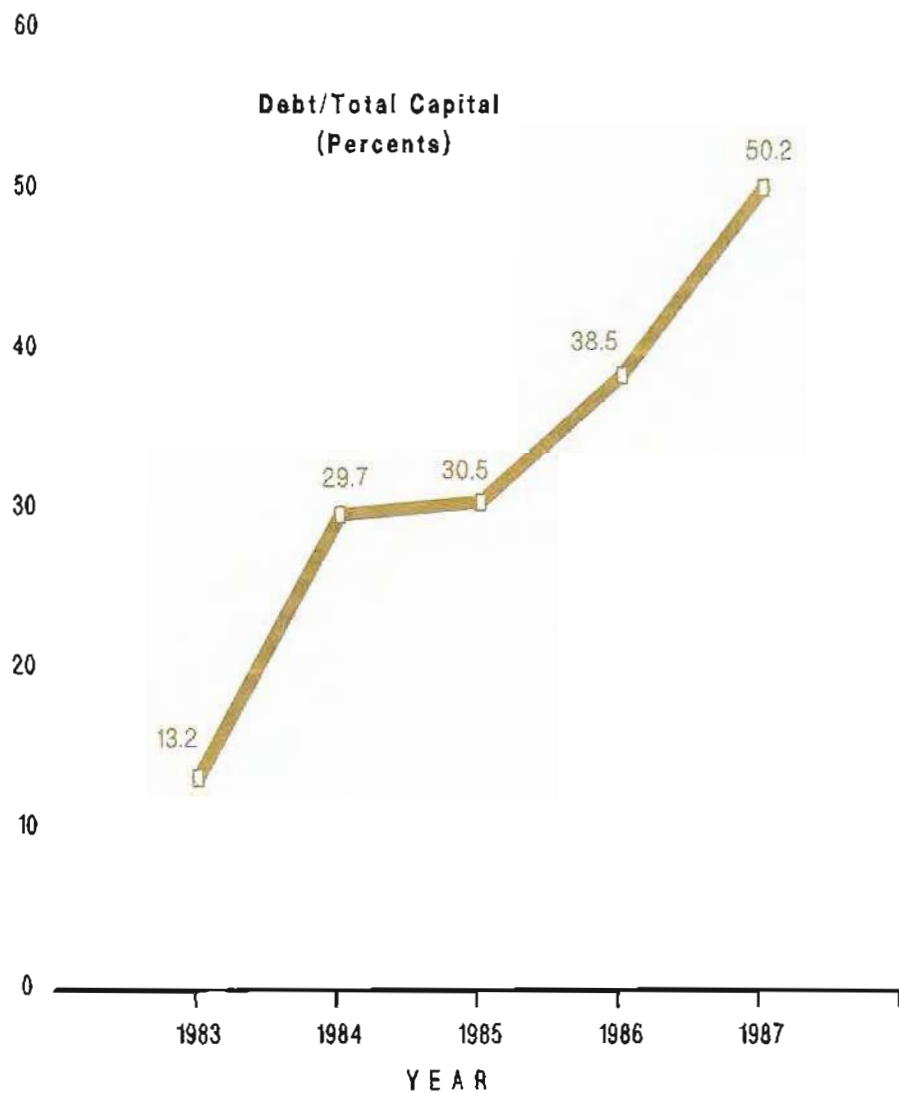
As a result of Grumman's growing use of debt, credit ratings on the corporation's debt securities and preferred stock were recently lowered by both Standard and Poor's Corporation and Moody's Investors Service. Standard and Poor's based its action on the expectation that Grumman's traditional business as a supplier of Navy airplanes will contract over the next several years. Standard and Poor's also cited Grumman's record debt and the fact that many of Grumman's programs are in the developmental stage, which tends to depress profits. Moody's Investors Service lowered its ratings on Grumman's senior debt and preferred stock, citing uncertainties about future business. Although Grumman's debt and preferred stock still have *investment grade* ratings, the downgrading means that Grumman will have to pay higher interest rates on new bonds and higher dividends on preferred stock if it goes to the public marketplace for financing.

The following liquidity, efficiency, leverage and coverage ratios are based on recent 10K reports which Grumman filed with the Securities and Exchange Commission. For purposes of analysis, Grumman's ratios have been compared with those for McDonnell Douglas and Northrop.

Liquidity ratios indicate the extent to which a given firm has cash or near-cash assets with which to pay its bills. At the end of 1987, the current ratio, which is the ratio of current assets to current liabilities, was 2.31 for Grumman, 1.13 for McDonnell Douglas and 0.76 for Northrop.



**Figure 5.3**  
**SELECTED FINANCIAL INDICATORS, 1983-87**  
**THE GRUMMAN CORPORATION**



Source: The Grumman Corporation



The quick ratio, which is the ratio of current assets less inventories to current liabilities, was 1.08 for Grumman, 0.31 for McDonnell Douglas and 0.44 for Northrop. In terms of these ratios, Grumman's financial position was more solid than that of either McDonnell Douglas or Northrop. That is, Grumman's current assets were 2.31 times its current liabilities as compared with a margin of only 1.13 times for McDonnell Douglas and 0.76 times for Northrop.

At the end of 1987, Northrop had the highest inventory turnover ratio, 9.71, followed by Grumman, 4.34, and McDonnell Douglas, 3.47. In effect, Northrop turned over its inventory 9.71 times annually and therefore its investment in inventory per dollar of sales was somewhat less. Grumman also collected its accounts receivable more slowly than the other firms. Whereas Grumman turned over its accounts receivable 5.80 times annually, the comparable ratio was 9.10 for McDonnell Douglas and 6.69 for Northrop.

Grumman also had a relatively unfavorable asset turnover ratio, which indicates how many sales dollars are generated by each dollar invested in assets. Grumman generated \$1.47 in sales for each dollar of assets as compared with \$1.54 for McDonnell Douglas and \$1.94 for Northrop. These firms also generated more net sales per employee than Grumman: \$125,571 for Northrop, \$116,958 for McDonnell Douglas and \$98,667 for Grumman.

A firm's debt ratio indicates how much of its total assets were financed with borrowed funds. Grumman's debt ratio, the ratio of total liabilities to total assets, was similar to that for the other major aerospace firms — 0.66 as compared with 0.65 for McDonnell Douglas and 0.70 for Northrop. However, Grumman's ratio of long-term debt-to-equity was higher than that of the other firms: 0.84 vs. 0.26 for McDonnell Douglas and 0.03 for Northrop.

At the end of 1987, Grumman's times interest earned ratio was only 1.70. This means that the Corporation's net operating income was 1.70 times its annual interest expense. The comparable ratio was 4.47 for McDonnell Douglas and 3.72 for Northrop.

## The HARRIS CORPORATION

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**Corporate Organization and Products.** Harris Corporation is a Florida-based company. Its five divisions include a semiconductor sector, a communications sector, a business products sector, an information systems sector and a government systems sector.

The Semiconductor Sector is a leading manufacturer of standard semicustom and custom integrated circuits used in advanced microprocessing, telecommunications, computer aided design and memory products. Harris is the eighth largest manufacturer of integrated circuits in the United States and the second largest supplier of circuits to the U.S. Government. This Sector recorded a net profit of \$10.4 million in fiscal 1987 as compared with a net loss of \$4.7 million in fiscal 1986.

The Communications Sector offers advanced products which permit point-to-point broadcast transmission of voice, data and video information. Its products span virtually all of the major transmission technologies and include systems for microwave, satellite, lightwave, broadcast, two-way radio and troposcatter transmission, auxiliary telecommunication products and turnkey communication systems. Net income from this sector was \$10.1 million in fiscal 1987 as compared with twelve million in fiscal 1986.

The Lanier Business Products Sector of the Company is a leading supplier of office-automation products, including stand alone and work group business systems, business telephones, private branch exchanges and dictation equipment. During fiscal 1987, net income for this sector increased 4.5% to \$25.6 million.

The Information Systems Sector provides computers, software, workstations and data-communication, computer-integration, voice-switching and specialized information-handling systems for the domestic and international markets. In fiscal 1987, this sector recorded a net profit of \$0.9 million as compared with a net loss of \$12.8 million in fiscal 1986.



**Table 5.6**  
**Selected Liquidity, Efficiency, Leverage and Coverage Ratios**  
**Grumman vs. McDonnell Douglas and Northrop**  
**December 31, 1987**

<b>Liquidity Ratios</b>	<b>Grumman</b>	<b>McDonnell Douglas</b>	<b>Northrop</b>
Current Ratio	2.31	1.13	0.76
Quick Ratio	1.08	0.31	0.44
<b>Efficiency Ratios</b>			
Inventory Turnover Ratio	4.34	3.47	9.71
Accounts Receivable Turnover Ratio	5.80	9.10	6.69
Asset Turnover Ratio	1.47	1.54	1.94
Net Sales/Employee	\$98,667	\$116,958	\$125,571
<b>Leverage Ratios</b>			
Debt Ratio	0.66	0.65	0.70
Long Term Debt/Equity	0.84	0.26	0.03
<b>Coverage Ratios</b>			
Times Interest Earned Ratio	1.70	4.47	3.72

Source: 10K reports filed with SEC.

**Table 5.7**  
**Government Awards to the Harris Corporation, by Fiscal Year**  
**(\$000)**

<b>Service</b>	<b>84</b>	<b>85</b>	<b>86</b>	<b>87</b>
Air Force	362	430	256	313
Army	34	288	145	0
Navy	79,858	271,749	160,018	64,073
Corps. of Engineers	1,252	943	637	207
<b>Grand Total</b>	<b>81,506</b>	<b>273,410</b>	<b>161,056</b>	<b>64,593</b>

Source: DMS Contract Awards

**Table 5.8**  
**The Top Five Firms Ranked by Sales of Automated Test**  
**Equipment, 1985 (\$ Millions)**

	<b>Corporation</b>	<b>Sales</b>
1.	General Dynamics Corp.	\$237
2.	Harris Corp.	234
3.	Hughes Aircraft Co.	208
4.	McDonnell Douglas Corp.	157
5.	Westinghouse Co.	125



The Government Systems Sector is engaged in advanced development, design and production of custom electronic systems for U.S. Government agencies, foreign governments and commercial organizations. Net income for this sector was \$37.5 million in fiscal 1987 as compared with \$40.6 million in fiscal 1986.

The Corporation's Government Support Systems Division, which is the largest of Harris's twenty-one units in terms of sales and employees, is headquartered in Syosset, Long Island. It employs 2,000 workers at its Syosset and Westbury plants and an additional 700 workers in Florida. The Division is a leader in the automatic test equipment field. It has an interesting history. During the 1950s, firms that built airplanes also built test equipment for them. During the 1960s, the Navy decided that it needed one computer system to test a variety of equipment. In 1968, a Syosset firm, Polytechnic Research and Development (PRD) won a contract to become the sole supplier of automatic test equipment for the Navy. Harris Corporation later acquired PRD and the new company was known as Harris-PRD Electronics. In 1983, this unit became the Government Support Systems Division of the Harris Corporation. Approximately 40% of Harris Corporation's current sales and income is generated by the Government Systems Division. The Division has remained primarily a Navy contractor. Harris Corporation received \$81.5 million in government contracts in fiscal 1984, \$273.4 million in fiscal 1985, \$161.1 million in fiscal 1986 and \$64.6 million in fiscal 1987. Most of it came from the Navy.

The Government Support Systems Division is now encountering stiff competition from firms like Grumman, Rockwell International and General Dynamics Corporation, which have entered the field. This is affecting profit levels. In 1985, Harris Corporation ranked second nationally in terms of sales of automated test equipment.

It is the future of the Government Support Systems Division which is of concern in evaluating the future role of the defense sector on Long Island. The Division's defense work is concentrated in measurement systems and automatic test equipment, intelligence and aircraft avionics. These should fare relatively well in future defense budgets. Congress has appropriated \$3 billion annually for automated test equipment for the last decade. The Division also expects to maintain and repair the \$800 million worth of automatic test systems it has delivered to the Navy over the past two decades.

In fiscal year 1987, Harris expanded its role as a supplier of military automatic test equipment. It won a major U.S. Air Force contract. As a subcontractor to Singer-Kearfott, Harris is developing ADINTS, an automatic depot inertial navigation test system designed specifically to test aircraft navigational systems. Under a contract from Rockwell International, Harris is also developing test-program sets for the Air Force's B-1B bomber. The Government Support Systems Division is also developing the Integrated Diagnostic Support System (IDSS). It will allow engineers to design self-diagnostic capabilities into avionics and electronics systems while they are still on the drawing boards. The IDSS will collect fault-related data and process it in ways that resemble human reasoning. It will be able to isolate faults down to the micro-chip level, to determine what's wrong and to advise a technician on corrective action. Harris expects IDSS to be fully developed within two to three years. The software involved could be used in everything from surface ships to jet fighters to tanks. Harris has also recently introduced a Portable Maintenance Aid (PMA), which is a stand alone tester for use in areas where extreme environmental conditions exist. It has also produced Flexmate, a small computer to be used in the Air Force's Modular Automatic Test Equipment (MATE) system. The Division is also bidding on communications equipment for NASA's manned space station, on a test system for the Navy's Phoenix Missile and on test equipment for the space shuttle.

On the minus side, the Division's prime manufacturing work is slated to end in 1989. This includes its line of Navy automatic test equipment computers known as ATS (V)1, ATS (V)2 and the Hybrid Test System.

Harris has launched a major effort to reduce costs and expenses and Long Island remains a high cost area. Therefore, it is conceivable that the manufacturing operations of the Government Support Systems Division will be shifted to the Division's lower-cost Florida facilities as competition in the market for measurement systems and automatic test equipment intensifies.

**Finances.** Harris Corporation's capital structure has been characterized by the declining use of long-term debt. Its ratio of long-term debt to total capital declined from 25.3% in 1983 to 12.9% in 1987. The Corporation's interest expense declined accordingly. Moody's Investors Service has rated Harris's bonds A3 and its commercial paper P-2.



**Table 5.9**  
**Selected Financial Indicators, 1982-87, The Harris Corporation**  
(\$ Millions)

Year	Long-Term Debt	Long-Term Debt/ Total Capital	Net Income*	Net Sales	Net Income/ Sales	Earnings/ Share
1983	257	25.3	63.8	1,809.3	3.5	1.62
1984	213	20.7	80.4	1,995.8	4.0	2.02
1985	190	18.0	80.3	2,281.2	3.5	2.00
1986	183	16.9	59.6	2,216.6	2.7	1.48
1987	146	12.9	84.5	2,079.0	4.1	2.05

\*From continuing operations

Source: The Harris Corporation

During the 1983-87 period, sales by the Harris Corporation increased from \$1.8 billion to almost \$2.1 billion, a gain of about 15% or 3.7% annually. During the same period, the firm's net income rose from \$63.8 million to \$84.5 million, an increase of 32% or 8.1% annually. As a result, the ratio of net income to sales increased from 3.5% in 1983 to 4.1% in 1987. Earnings per share increased from \$1.62 in 1983 to \$2.05 in 1987.

The following liquidity, efficiency, leverage and coverage ratios are based on recent 10K reports which the Harris Corporation filed with the Securities and Exchange Commission. For purposes of analysis, Harris's ratios have been compared with those for the IBM Corporation. Both firms share similar product lines.

Harris's current ratio was 1.94 as of June 30, 1987, indicating that its current assets were 1.94 times larger than its current liabilities. This was slightly below the comparable ratio for IBM, 2.32, as of December 31, 1987. Harris's quick ratio was 1.07 as compared with 1.56 for IBM.

Harris's inventory turnover ratio was slightly higher than that of 7.90 versus 6.27. In effect, Harris is turning over its inventories 7.9 times annually. Harris also collected its accounts receivable more rapidly than IBM. Its accounts receivable ratio was 5.52 as compared with 3.91 for IBM. The asset turnover ratio was 1.16 for Harris and 0.85 for IBM. This means that Harris generated \$1.16 in sales for each dollar invested in assets. IBM generated only 85 cents in sales for each dollar of assets. However, IBM generated a higher dollar volume of sales per employee than Harris: \$139,251 versus \$85,554.

Harris's debt ratio was 0.45 as compared with 0.40 for IBM. In effect, Harris financed 45% of its assets with borrowed funds and IBM financed 40% of its assets with borrowed funds. Both firms had a relatively low ratio of long-term debt to equity: 0.15 for Harris and 0.10 for IBM.

There was a relatively large difference between the two firms in terms of the times interest earned ratio. This ratio was 18.75 for IBM and 7.26 for Harris. Thus, IBM's operating income was 18.75 times its annual interest expense and Harris Corporation's was 7.26 times its annual interest expense.

**Table 5.10**  
**Selected Liquidity, Efficiency, Leverage and Coverage Ratios**  
**Harris vs. IBM Corporation**

	Harris 6/30/87	IBM 12/31/87
<b>Liquidity Ratios</b>		
Current Ratio	1.94	2.32
Quick Ratio	1.07	1.56
<b>Efficiency Ratios</b>		
Inventory Turnover Ratio	7.90	6.27
Accounts Receivable Turnover Ratio	5.52	3.91
Asset Turnover Ratio	1.16	0.85
Net Sales/Employee	\$85,554	\$139,251
<b>Leverage Ratios</b>		
Debt Ratio	0.45	0.40
Long Term Debt/Equity	0.15	0.10
<b>Coverage Ratios</b>		
Times Interest Earned Ratio	7.26	18.75

Source: 10K reports filed with SEC



## UNISYS CORPORATION

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**Corporate Organization, Location of Facilities.** Unisys was formed by the merger of the Sperry Corporation and the Burroughs Corporation in 1986. Both corporations had been strong competitors in a number of product areas including computer systems, electronic systems, systems management and support, communications systems, document processing and transmission, command and control devices, work station design and records management and C.A.D./C.A.M. systems. The principal objective of the merger was to create a company large enough to alter the industry's competitive structure and to successfully challenge the IBM Corporation. To date, the merger has permitted cuts in duplicative costs, higher levels of R & D spending and a greater corporate presence in a number of end-use market areas. In 1987, with \$2.3 billion in military awards, Unisys ranked as the nation's 11th largest defense contractor. Grumman was 10th with \$3.4 billion in awards. Unisys has replaced Digital Equipment Corporation as the nation's second largest computer manufacturer.

The former Sperry operation on Long Island is now called the Shipboard and Ground Systems Division. This Division was created by the consolidation of the Surveillance and Fire-Control Systems Division and the Systems Management Division. The net effect was to strengthen the operation as a whole by combining strong radar capabilities with systems integration expertise. There are some 4,900 employees at the Great Neck headquarters of the Division and at a testing, simulation and training center in Ronkonkoma. The Shipboard Group is the largest of five defense groups reporting to Unisys's Defense Systems operation in McLean, Virginia. It accounts for slightly more than 10% of Unisys's overall revenues. The Group's existing contracts represent one-third of Unisys's defense dollars. The Shipboard and Ground Systems Division is the only unionized Unisys defense unit. The Corporation's facilities in Waterbury, Connecticut and McLean, Virginia are not unionized.

**Current and Future Programs.** For over 30 years, the Shipboard and Ground Systems Division has provided total management support -- concept, design, development, testing, deployment and life cycle support -- for the navigational systems installed on the U.S. Navy's strategic submarine fleet. The Division is currently designing and building navigation subsystems for the Navy's Trident II submarine. It has an \$800 million contract to develop the systems and in 1986 won a \$500 million contract to build twelve systems. The Division also provides fire control systems, the guidance and directional systems used for the Navy's Perry Class of frigate ships. Its two contracts in this area are worth a total of more than \$1.1 billion. The Division is designing electronics and combat systems for Canadian patrol frigate ships under a \$1.25 million contract. It is integrating combat systems for Navy ships at its Ronkonkoma facility under a \$400 million contract. It is designing automated test systems for the Air Force under a \$50 million contract. It also has a \$48 million contract to develop and deploy an air traffic control system for the Marine Corps.

The Shipboard and Ground Systems Group is currently working on an \$80 million contract to build three prototypes of the North Warning System, a short-range radar system with the capability to distinguish between missiles and smaller objects, such as birds, over distances of 100 miles. After the engineering and development phase, the Company hopes to win a \$400 million contract to produce 37 of the systems. The project could ultimately be worth \$2 billion.

In 1987, Unisys won a \$450 million contract from the National Oceanic and Atmospheric Administration of the U.S. Commerce Department to build ten next-generation weather radar systems for the National Weather Service. The Company has an option for another 185 systems. Most of the work will be performed at Company facilities in Great Neck and Connecticut. The system, called *NEXRAD* will be installed throughout the U.S., the Caribbean, Western Europe and parts of the Pacific. The new radars will replace systems built in the 1950s and are expected to be installed by the mid-1990s.

In 1987, Unisys was also selected as an alternate supplier for the combat system, the advanced anti-air warfare system used by the U.S. Aegis Navy. The system will be used aboard more than 50 guided missile cruisers and destroyers and is expected to be the mainstay of the Navy's battle group anti-aircraft defenses into the next century. Unisys will share up to \$2 billion in expected contracts under this program over the next eight to ten years.



The Shipboard Division's work is long-term in nature and is concentrated in areas that are not likely to be vulnerable to cuts by Congress or the Pentagon. However, Shipboard's military contracts are heavily dependent on the Navy and its future defense work may be vulnerable to fluctuations in Navy spending. Unisys's Long Island operations received military awards totaling \$818 million in fiscal 1984, \$620 million in fiscal 1985, \$347 million in fiscal 1986 and almost \$149 million in fiscal 1987. Virtually all of this funding came from the Navy.

Unisys's Long Island defense operations will be affected not only by future Navy funding levels but also by management decisions within the Corporation. For example, Unisys could conceivably sell off part or all of its Long Island defense operations to raise cash in its competitive battle with IBM. Another possibility is that it will move some of its defense operations off Long Island to its lower-cost non-unionized facilities.

**Table 5.11**  
**Government Awards to Unisys Corporation, by Fiscal Year**  
**Long Island Locations Only**  
**(\$000)**

Service	1984	1985	1986	1987
Air Force	55,301	56,346	47,548	12,794
Army	253	0	236	0
Dept. of Transportation	1,885	2,304	1,911	482
Navy	746,464	554,407	282,636	126,994
Corps. of Engineers	375	65	60	0
Other	13,752	7,027	14,490	8,384
<b>Grand Total</b>	<b>818,030</b>	<b>620,149</b>	<b>346,881</b>	<b>148,654</b>

Source: DMS Contract Awards

**Finances.** At the end of 1987, Unisys had assets of almost \$9.96 billion. Its 1987 revenue totaled more than \$9.7 billion. The Corporation's balance sheet was characterized by current liabilities of almost \$3.48 billion and long-term debt of \$1.93 billion as of December 31, 1987.

It is possible to perform a financial ratio analysis for the Sperry Corporation for those years prior to its merger with the Burroughs Corporation based on the 10K reports which Sperry filed with the Securities and Exchange Commission. The following analysis is based on these reports.

As of March 31, 1986, Sperry's current ratio was 2.32, indicating that its current assets were 2.32 times larger than its current liabilities. Its quick ratio was 1.25. Sperry's inventory turnover ratio was 4.32, indicating that the Company turned over its inventory 4.32 times annually. Sperry's accounts receivable turnover ratio was 4.93. Receivables were equivalent to 73 days' sales in 1986. Sperry's asset turnover ratio, the ratio of net sales to total assets, was 0.97 as of March 31, 1986. Thus, Sperry was generating \$0.97 in sales for each dollar invested in assets. Sperry's debt ratio was 0.48, indicating that 48% of its assets were financed with borrowed funds. Sperry's ratio of long-term debt-to-equity was 0.34 as of March 31, 1986. Sperry's times interest earned ratio was 3.77, indicating that its operating income was 3.77 times its annual interest expense.

**Table 5.12**  
**Selected Liquidity, Efficiency, Leverage and Coverage Ratios**  
**The Sperry Corporation, March 31, 1986**

Liquidity Ratios	Ratio
Current Ratio	2.32
Quick Ratio	1.25
<b>Efficiency Ratios</b>	
Inventory Turnover Ratio	4.32
Accounts Receivable Turnover Ratio	4.93
Asset Turnover Ratio	0.97
Net Sales/Employee	\$87,072
<b>Leverage Ratios</b>	
Debt Ratio	0.48
Long Term Debt/Equity	0.34
<b>Coverage Ratio</b>	
Times Interest Earned Ratio	3.77

Source: 10K reports filed with SEC



## The HAZELTINE CORPORATION

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In December, 1986, the Hazeltine Corporation was purchased by Emerson Electric Company for an estimated \$189 million. Hazeltine employs some 2,400 workers on Long Island. Emerson is a \$6 billion corporation with products concentrated in three general market segments -- commercial and industrial, consumer products and government and defense. More than 80% of Hazeltine's basic corporate activities are concentrated in defense-related work, primarily command, communications, control and intelligence functions which coordinate the collection, processing and presentation of military data for decision-making. Hazeltine accounts for about 3% of Emerson's total sales volume. Hazeltine's contracts account for approximately one-fifth of Emerson's \$1 billion government and defense sector.

Emerson has acknowledged financial strength and strong managerial expertise. Its top management has developed a *best cost producer* strategy that embodies the following elements: dedication to quality, knowledge of competitors' costs, a focused manufacturing strategy, formalized cost reduction programs, an effective communications process and a commitment to capital expenditures for productivity. These elements have been implemented in Emerson's other operational units and they are currently being applied to Hazeltine. Under Emerson's management, Hazeltine's product quality and customer satisfaction will be emphasized.

**Current and Future Programs.** Emerson became a major defense supplier during World War II. At that time, the Company was the world's largest designer and manufacturer of aircraft gun turrets. Today, Emerson produces communications and radar equipment, automatic test equipment, electronic warfare and armaments, navigational aids and antisubmarine warfare equipment.

Hazeltine has expertise in display systems, communications systems, electronic identification systems, navigational systems and anti-submarine warfare systems. Hazeltine has had long experience in various types of defense display systems. The Company produces high quality color displays for various command and control operations. These include the Air Force's airborne early warning aircraft E-3 AWACS and the Navy's E-2 Hawkeye. Hazeltine has developed communications devices for the Army which enhance the capability of field radios to receive jam-free transmission under hostile environments. Hazeltine designed and is producing an Advanced Sonobuoy Communications Link (ASCL) for the Navy. The ASCL is a receiver used on antisubmarine warfare aircraft to receive signals transmitted by sonobuoys that listen for and locate enemy submarines.

Hazeltine is currently building 178 Microwave Landing Systems (MLS) for the Federal Aviation Administration under a \$90.6 million contract it won in 1983. Hazeltine had hoped to build an additional 1,250 units for the FAA to replace the aging instrument landing systems at most major airports. Therefore, the project has a potential value of up to \$2 billion. However, Hazeltine is two years behind schedule because of difficulties encountered in developing the system's complex software. The project is also significantly over budget. As a result, the General Accounting Office has recommended that no new funding be appropriated for the program. The GAO claims that the MLS technology is now more than ten years old and that even newer technologies may be available. It wants the MLS tested further before any new units are bought. Even if the MLS program proceeds, Hazeltine will have to compete with other companies for the right to build more systems. The MLS is Hazeltine's single largest contract. The program accounts for at least 50% of Hazeltine's projected sales over the next three to five years.

Hazeltine received defense prime contract awards totaling \$109.8 million in fiscal 1984, \$110.4 million in fiscal 1985, \$133.7 million in fiscal 1986 and \$88.9 million in fiscal 1987. Almost 60% of its fiscal 1987 awards came from the Navy.

Hazeltine's destiny is no longer solely in its own hands. Emerson regards Hazeltine as a good strategic fit with its own government and defense business. The long-term outlook for the company will depend on how fully it meets Emerson's expectations in terms of product quality, customer satisfaction and, ultimately, profitability.



**Table 5.13**  
**Government Awards to the Hazeltine Corporation,**  
**by Fiscal Year, (\$000)**

<b>Service</b>	<b>84</b>	<b>85</b>	<b>86</b>	<b>87</b>
Air Force	25,011	47,125	52,864	27,703
Army	32,611	7,350	11,973	7,581
Dept. of Transportation	32,594	23,012	23,077	0
Navy	19,365	32,561	44,995	52,895
Corps. of Engineers	232	321	809	737
<b>Grand Total</b>	<b>109,813</b>	<b>110,369</b>	<b>133,718</b>	<b>88,916</b>

Source: DMS Contract Awards

**Finances.** The following analysis draws on financial data for the Emerson Electric Company as a whole and on 10K reports that Hazeltine filed with the SEC prior to 1986.

As of September 30, 1987, Emerson's assets totaled almost \$4.87 billion. For the year ending September 30, 1987, Emerson recorded net earnings of \$467.2 million on net sales of \$6.17 billion. Thus, net earnings were equivalent to 7.6% of net sales. Emerson's long-term debt as of September 30, 1987 was \$553 million. The firm's debt increased by \$160 million between September 30, 1986 and September 30, 1987 with the additional funds used to finance acquisitions and repurchase stock. The increase in debt raised Emerson's interest expense from \$53.8 million in the year ending September 30, 1986 to \$83.5 million in the year ending September 30, 1987. Emerson's debt securities continue to receive Moody's highest ratings, Aaa for bonds and P-1 for commercial paper.

The following analysis pertains to Hazeltine's liquidity, efficiency, and leverage ratios. As of December 31, 1985, the latest date for which separate Hazeltine figures are available, Hazeltine's current ratio was 1.51 and its quick ratio was 0.91. Thus, the Corporation's current assets were 1.51 times larger than its current liabilities. Hazeltine's inventory turnover ratio was 4.78 at the end of 1985, indicating that the Company turned over its inventory 4.78 times during the year. Inventories were equivalent to about 75 days' sales at the end of 1985. Hazeltine's accounts receivable ratio was 4.40 at the end of 1985 as compared with 6.09 at the end of 1983.

Receivables were equivalent to 59 days' sales at the end of 1983 as compared with almost 82 days' sales at the end of 1985, indicating that the Company was collecting its accounts receivable at a slower pace. Hazeltine's asset turnover ratio was 1.30 at the end of 1985 so that the company was generating \$1.30 in sales for every dollar invested in assets. Hazeltine's debt ratio stood at 0.55 at the end of 1985. In effect, 55% of its assets were financed with borrowed funds.

**Table 5.14**  
**Selected Liquidity, Efficiency and Leverage Ratios**  
**The Hazeltine Corporation, December 31, 1985**

<b>Liquidity Ratios</b>		<b>Ratio</b>
Current Ratio		1.51
Quick Ratio		0.91
<b>Efficiency Ratios</b>		
Inventory Turnover Ratio		4.78
Accounts Receivable Turnover Ratio		4.40
Asset Turnover Ratio		1.30
Net Sales/Employee		N.A.
<b>Leverage Ratios</b>		
Debt Ratio		0.55
Long Term Debt/Equity		1.22

N.A. - Not Available

Source: 10K reports filed with SEC



## EATON CORPORATION'S AIL DIVISION

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Eaton Corporation, based in Cleveland, Ohio, is a manufacturing firm whose principal products include truck powertrain components, hydraulic products, automotive and appliance controls and consumer appliances. Approximately two-thirds of Eaton's profits come from automotive parts. Eaton, like Emerson, has a defense systems division, AIL, which is based on Long Island. When Eaton purchased the Milwaukee-based Cutler-Hammer Company in 1979, it inherited the AIL Division of Cutler-Hammer, a small defense operation. Unlike Emerson, Eaton has decided to divest itself of AIL. Eaton's 1987 annual report indicates: "Our defense electronics business...is at the stage where it requires substantial expansion to succeed over the long term. Eaton is unwilling to make the investments needed for that growth given the better opportunities in our commercial businesses". Operating profit margins for Eaton's truck parts are approximately double those of its defense business. Eaton plans to sell its seven defense divisions as separate entities. These units include AIL in Deer Park, the Command Systems Division in Farmingdale and five west coast units. Approximately 80% of Eaton's defense business comes from AIL.

**Current and Future Programs.** In 1981, AIL won a \$3.5 billion contract to build the ALQ-161 defensive avionics system for the B-1B bomber. The system allows the plane to penetrate enemy air defenses by foiling enemy radar. AIL was one of four major contractors on the \$20.5 billion B-1B program; Rockwell International Corporation built the planes. AIL built 100 ALQ-161 units and completed delivery in the Fall of 1987. However, the project was plagued with problems. The Air Force accused AIL of illegal activities, including falsifying payment requests, in connection with its contract to make avionics equipment for the B-1B bomber. AIL subsequently agreed to pay the government \$6 million to settle the problem but admitted no wrongdoing. In addition, the Air Force withheld \$159 million in progress payments to AIL for defective work on the B-1B avionics system. Some analysts believe that AIL

was not large enough to handle the B-1B program. There were also unique problems related to producing an avionics system which is at the cutting edge of technology. It is estimated that AIL earned a profit of \$200 million on the B-1B program and that future modifications and upgrades of the ALQ-161 equipment could give AIL additional business worth \$150 million to \$200 million annually.

The completion of B-1B work means that AIL will no longer be a \$1 billion division. Revenues from AIL are expected to slow to \$500 million by 1990. AIL does have other work. It has built electronic jamming equipment for the Navy's EA-6B Prowler since the late 1960s and does approximately \$100 million a year in business on this program. It also has a small Pentagon contract to develop a plan to design miniaturized, higher-frequency devices to replace existing microwave subsystems that are used to prevent detection of an airplane by enemy radar. This is a growing area and the Pentagon is expected to spend nearly \$4 billion on microwave components by 1990.

AIL also had an \$81.5 million contract for development of a new jamming system for the EF-111A jet aircraft. The EF-111A is a version of the F-111 bomber, which is specially equipped to deceive or jam enemy radar and radio systems during bombing attacks. The AIL Division of Eaton was awarded the contract in October, 1984. However, in June, 1988, the Air Force claimed that AIL had defaulted on the contract and asked for repayment of \$39 million in progress payments. The Air Force claimed that AIL had delivered only \$19,500 worth of work. Moreover, AIL's estimated delivery dates were thirty months behind schedule and the Company was estimating a cost overrun of \$71.5 million beyond original estimates.

The AIL Division received defense prime contracts valued at \$1.05 billion in fiscal 1984, \$854.6 million in fiscal 1985, \$949.1 million in fiscal 1986 and \$202.8 million in fiscal 1987. Virtually all of its funding came from the Air Force.

Recent management and image problems may make it difficult to find a buyer for Eaton's defense operations. Potential buyers are limited to a few large defense contractors who are cash rich and who have the motivation to turn Eaton's defense business around. Hence, the future of AIL and its 4,600 employees is highly uncertain.



**Table 5.15**  
**Government Awards to the AIL Division of Eaton Corporation,**  
**by Fiscal Year (\$000)**

Service	84	85	86	87
Air Force	1,033,139	813,996	912,677	115,895
Army	4,373	1,703	1,085	5,040
Dept. of Transportation	913	3,778	395	3,160
NASA	1,655	2,686	4,006	850
Navy	11,511	32,200	28,078	77,412
Corps. of Engineers	168	198	1,808	475
Other	45	0	1,031	0
<b>Grand Total</b>	<b>1,051,804</b>	<b>854,561</b>	<b>949,080</b>	<b>202,832</b>

Source: DMS Contract Awards

**Finances.** No separate financial statistics are available for Eaton's AIL Division. However, in its 1987 annual report, Eaton provided selected financial statistics for its *discontinued* defense electronics operations which include AIL. These consist of avionics and defense electronics, electronic counter-measures, air traffic/vessel traffic control systems, radar systems, and information management systems. Net assets of the discontinued operations were \$632.6 million at the end of 1987. In 1987, the discontinued operations recorded a net loss of \$5.0 million on net sales of \$915.6 million.

During the fourth quarter of 1987, the Company provided \$59.3 million, before income tax credits of \$23.7 million, primarily for estimated losses on its EF-111 program with the United States Government as a result of revised estimated costs to complete the contract.

The Eaton Corporation as a whole remains profitable. Its 1987 income from continuing operations was \$206 million on sales of more than \$3.1 billion. In 1986, these operations generated income of \$112 million on sales of \$2.76 billion.

**Table 5.16**  
**Selected Financial Statistics, Eaton Corporation's**  
**Discontinued Operations (Millions)**

	12/31/86	12/31/87
Net Assets	\$561.7	\$632.6
Net Sales	1,051.8	915.6
Income (Loss)	25.6	(5.0)

Source: Eaton Corporation Annual Report 1987, P.26.

## The FAIRCHILD-WESTON DIVISION of SCHLUMBERGER

Schlumberger, Ltd. is a multi-national conglomerate headquartered in France. In 1979, the firm acquired one of Long Island's oldest defense suppliers, Fairchild Camera and Instrument Corporation, for approximately \$425 million. Fairchild, not to be confused with the Republic Division of Fairchild Industries which closed its Long Island operations in 1987, had about \$4 billion in revenues and \$666 million in net income in 1979. In 1987, Schlumberger sold the Fairchild Semiconductor Corporation at a substantial loss but retained the more profitable segments of the original Fairchild Company. These included the aerospace, defense and automatic test equipment products and systems that had been absorbed into their Sangamo-Weston Division at the time of the original acquisition. Organized as the Fairchild-Weston unit of Sangamo-Weston, it maintains a small presence on Long Island in the production of optical and electro-optical data acquisition equipment, the development of signal processing systems for aerospace and defense use and the production of controls for nuclear power systems.

**Current and Future Programs.** Fairchild-Weston produces electronic equipment and systems that effectively prevent enemy jamming of tactical military communications. Fairchild-Weston has also developed advanced instrumentation and controls for nuclear power systems. This type of defense technology has wide applications on vessels, particularly submarines, as well as on various types of space vehicles. Fairchild-Weston's optical and electro-optical data acquisition equipment and signal processing systems have a long heritage dating back to the period prior to World War II. Today, this segment of Fairchild's defense business includes telemetry devices and electro-optical systems such as cockpit T V. for military aircraft.

Fairchild-Weston received government awards of \$21.9 million in fiscal 1984, \$77.2 million in fiscal 1985, \$29.8 million in fiscal 1986 and \$4.9 million in fiscal 1987.



**Table 5.17**  
**Government Awards to the Fairchild-Weston Division of**  
**Schlumberger, Ltd., by Fiscal Year (\$000)**

<b>Service</b>	<b>84</b>	<b>85</b>	<b>86</b>	<b>87</b>
Air Force	11,106	6,193	1,525	-43
Army	6,211	45,527	12,487	4,859
NASA	181	0	0	0
Navy	3,876	25,075	15,471	98
Corps. of Engineers	551	418	285	0
<b>Grand Total</b>	<b>21,925</b>	<b>77,213</b>	<b>29,768</b>	<b>4,914</b>

Source: DMS Contract Awards

Fairchild-Weston, because its business is concentrated in command, control, communications and intelligence systems defense contracts, is not likely to see its domestic market decline significantly in the 1990s. One big plus is that the Division provides instrumentation and control devices for nuclear power systems. This aspect of its business is likely to grow because the aging submarine fleets of both the United States and its allies are slated to be replaced. Moreover, these types of instrumentation and controls have space applications. The fact that Fairchild-Weston is part of a multinational conglomerate headquartered in France may also give it greater access to the defense establishments of the various NATO countries. Fairchild-Weston is also known in the defense business for its quality products and systems which are usually delivered on time and within acceptable cost parameters. However, Fairchild-Weston is relatively small and may require additional capital in order to compete effectively in the future. The extent to which Schlumberger is willing to supply this capital will influence Fairchild-Weston's future role within the Long Island economy.

## **CONCLUSIONS:**

### **The Future of Long Island's Leading Defense Firms**

The foregoing analysis suggests that Long Island has lost some of its attractiveness for its major defense contractors. High living costs and production costs at a time of more stringent cost competition within the defense industry are forcing the major contractors to

reevaluate their continuing commitment to Long Island. Some firms, notably the AIL Division of the Eaton Corporation, are experiencing financial difficulties. AIL has been put up for sale and unless a suitable buyer is found, the AIL Division could conceivably disappear from the Long Island scene. The long-term outlook for Hazeltine also depends on how well it meets Emerson Electric Company's expectations in terms of future profitability. Fairchild-Weston remains competitive, but because of its relatively small size, it may require future infusions of capital from its parent, Schlumberger, Ltd. Unisys's Long Island operation, its Shipboard and Ground Systems Group, has contracts that are long-term in nature and concentrated in areas that are not likely to be vulnerable to defense cuts. However, there is a possibility that Unisys could sell some of its Long Island defense operations to raise some of the cash needed in its competitive battle with IBM. Harris Corporation's Government Support Systems Division, its Long Island operation, is now encountering stiff competition in the automatic test equipment field from firms like Grumman, Rockwell International and General Dynamics Corporation. Harris is likely to move its manufacturing operations to its lower-cost Florida facilities. Grumman, Long Island's largest defense contractor, is positioning itself strategically to move into new markets. As the market for airframe production contracts, Grumman hopes to move more aggressively into the markets for electronics, special purpose vehicles and information services. Many of these growth activities will take place off of Long Island.

It would appear that the Long Island economy must adjust to the ultimate contraction and possibly the disappearance of some of its largest defense firms. The adjustment will entail retraining displaced workers and reintegrating them into the economy. Any such contraction will also have a major impact on Long Island's second and third-tier defense suppliers who must learn to do business with more distant prime contractors and to deal directly with the government in a radically different environment for defense procurement.

Chapter 6 analyzes the work being performed by a cross-section of smaller Long Island defense firms and reviews Long Island's capabilities in terms of second and third-tier defense production. Chapter 7 analyzes the characteristics of the workforce within major Long Island defense firms to determine the magnitude of any potential adjustment process.



## CHAPTER 6...

# LONG ISLAND'S SMALLER DEFENSE FIRMS: EMPLOYMENT SIZE, WORK PERFORMED

This chapter analyzes the type of work being performed by a cross-section of smaller Long Island defense firms. Many are second and third-tier suppliers. Some are likely to experience business reverses if the business prospects of Long Island's leading defense firms worsen.

### The PROGRAMS of LONG ISLAND'S SMALLER DEFENSE FIRMS

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A sample of fifty firms were analyzed. Of these, thirty received defense prime contract awards valued at less than \$10 million during the fiscal 1984 through 1986 period; twenty-two received awards valued at between \$10 million and \$50 million during this period; and, three received awards of more than \$50 million. Information concerning the dollar value of contracts by firm, program, source and type of contract was obtained from the DMS Marketing Service of Greenwich, Connecticut. Information concerning the employment and square footage of each firm was obtained from the Long Island Directory of Manufacturers for 1987-88.



**Bulova Systems and Instruments Corporation.** Bulova is located in Valley Stream. It employs 800 persons and occupies approximately 225,000 square feet of space. The firm manufactures ordnance fuses, safe arm devices and specialized automated assembly and test equipment. The firm received prime contract awards totaling \$173.8 million during the fiscal 1984-86 period. Approximately 96% of this dollar amount represented purchases of fuses and primers by the Army.

**Table 6.1**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Bulova Systems and Instrument Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Fuses & Primers	166,788	Army	171,756	Research & Development	360
Maintenance/Repair of Ammunition	2,235	Navy	238	Expert Consulting Services	59
Missile Warheads & Explosive Components	1,897	Air Force	1,791	Maintenance/Repair	2,235
Other	2,865	Total	173,785	Production	171,131
<b>Total</b>	<b>173,785</b>			<b>Total</b>	<b>173,785</b>

Source: DMS Marketing Service

**Miltipe Corporation.** The Miltipe Corporation is located in Melville. It employs more than 250 persons and occupies about 170,000 square feet. It produces computer equipment and militarized computer peripherals. During the fiscal 1984-86 period, the firm received Defense Department awards of more than \$59 million. The preponderance of these awards were for automatic data processing (ADP) input/output and storage devices and for ADP accessorial equipment. The Company's principal defense customer was the Navy.

**Table 6.2**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Miltipe Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
ADP Input/Output & Storage Devices	48,156	Army	906	Research & Development	238
ADP Accessorial Equipment	6,422	Navy	48,742	Production	58,950
Other	4,610	Air Force	9,540	<b>Total</b>	<b>59,188</b>
<b>Total</b>	<b>59,188</b>	<b>Total</b>	<b>59,188</b>		

Source: DMS Marketing Service



**AUL Instruments, Inc.** AUL Instruments is located in Garden City. It employs approximately 195 persons and occupies 95,000 square feet of floor space. The firm produces electronic equipment and electronic and electromechanical assemblies. During the fiscal 1984-86 period, it received prime contract awards valued at approximately \$60.5 million. The Company's principal customer was the Air Force, which accounted for 82% of these awards. The funds were earmarked primarily for production as opposed to research and development.

**Table 6.3**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**AUL Instruments, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Launchers, Guided Missiles	38,495	Army	9,063	Research & Development	50
Misc. Communications Equipment	5,063	Navy	1,085	Production	60,462
Radio & TV Communications Equipment, except Airborne	4,856	Air Force	49,768	<b>Total</b>	<b>60,512</b>
Telephone & Telegraph Equipment	2,408	Defense Agencies	596		
Air Frame Structural Components	6,538	<b>Total</b>	<b>60,512</b>		
Other	3,152				
<b>Total</b>	<b>60,512</b>				

Source: DMS Marketing Service

**EMS Development Corporation.** The EMS Development Corporation is located in Farmingdale. It employs approximately 100 persons and occupies 80,000 square feet. It produces electronic control systems for the U.S. and foreign governments. During the fiscal 1984-86 period, the firm received awards of approximately \$28.1 million. The Company's principal products are electrical and electronic measuring and testing devices. Their principal defense customer was the U.S. Navy.

**Table 6.4**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**EMS Development Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Electrical & Electronic Measuring & Testing Instruments	22,617	Navy	28,113	Research & Development	111
Operational Training Devices	2,356	<b>Total</b>	<b>28,113</b>	Production	28,002
Armament Training Devices	2,865			<b>Total</b>	<b>28,113</b>
Other	275				
<b>Total</b>	<b>28,113</b>				

Source: DMS Marketing Service



**General Instrument Corporation.** General Instrument is located in Hicksville. It employs approximately 6,000 workers and occupies 250,000 square feet of plant space. It is a producer of semiconductors and rectifiers. During the fiscal 1984 through 1986 period, it received defense prime contract awards totaling almost \$40.6 million. The firm's primary defense customer was the Navy. It received contracts both for the maintenance and repair of communications equipment and the production of airborne radar equipment.

**Table 6.5**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**General Instrument Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Maintenance/Repair of					
Communications Equipment	13,089	Navy	39,956	Expert Consulting Services	91
Radar Equipment, Airborne	12,869	Air Force	548	Maintenance/Repair	15,709
Underwater Sound Equipment	3,936	Defense Agencies	95	Production	21,553
Other	10,705	<b>Total</b>	<b>40,599</b>	Other	3,246
<b>Total</b>	<b>40,599</b>			<b>Total</b>	<b>40,599</b>

Source: DMS Marketing Service

**North Atlantic Industries, Inc.** North Atlantic Industries is located in Hauppauge. It employs about 250 persons and occupies 66,000 square feet of space. It produces electronic countermeasures equipment. During the fiscal 1984 through 1986 period, the Company received defense prime contracts valued at \$44.4 million. Two-thirds of this amount reflected purchases of electronic countermeasures equipment. The Company's principal defense customer was the U.S. Navy.

**Table 6.6**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**North Atlantic Industries, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Electronic Countermeasures Equipment	29,236	Navy	42,790	Architectural/Engineering	
Sound, Record and Reproducing		Air Force	1,268	Services	1,801
Equipment	5,405	Defense Agencies	374	Training Services	1,825
Other	9,791	<b>Total</b>	<b>44,432</b>	Production	40,806
<b>Total</b>	<b>44,432</b>			<b>Total</b>	<b>44,432</b>

Source: DMS Marketing Service



**Telephonics Corporation.** Telephonics is located in Huntington. It employs approximately 700 persons and occupies 160,000 square feet. It produces multiplexing systems and other communications equipment. During the fiscal 1984 through 1986 period, the firm received defense prime contract awards totaling more than \$28.6 million. This reflected awards for the production of airborne intercom and public address systems and miscellaneous communications equipment. The Navy was the firm's principal defense customer.

**Table 6.7**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Telephonics Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Aircraft Engineering Development	3,464	Army	6,894	Research & Development	3,566
Intercom & Public Address Systems, Airborne	13,104	Navy	20,980	Maintenance/Repair	457
Misc. Communications Equip.	10,388	Air Force	172	Production	24,628
Other	1,695	Defense Agencies	605	<b>Total</b>	<b>28,651</b>
<b>Total</b>	<b>28,651</b>	<b>Total</b>	<b>28,651</b>		

Source: DMS Marketing Service

**Republic Electronic Industries Corporation.** Republic Electronic Industries is located in Hauppauge. It employs approximately 200 persons and occupies 50,000 square feet of floor space. It produces ground support equipment, radar equipment and measuring and testing instruments. During the fiscal 1984 through 1986 period, the firm received prime contract awards valued at more than \$28.6 million. The preponderance of these awards were for production of ship and marine equipment and for non-airborne radar equipment. The Company's principal defense customer was the U.S. Navy.

**Table 6.8**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Republic Electronic Industries Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Electrical & Electronic Measuring & Testing Instruments	4,395	Navy	24,354	Production	27,830
Miscellaneous Ship & Marine Equipment	13,184	Air Force	4,255	Other	810
Radar Equipment, except Airborne	7,313	Defense Agencies	31	<b>Total</b>	<b>28,640</b>
Other	3,748	<b>Total</b>	<b>28,640</b>		
<b>Total</b>	<b>28,640</b>				

Source: DMS Marketing Service



**Poly Scientific Research and Development Corporation.** Poly Scientific Research was one of the smaller firms in the sample. It is located in Bay Shore, where it employs approximately 10 persons and occupies 22,600 square feet of space. It produces chemicals and reagents. During the fiscal 1984 through 1986 period, Poly received defense contracts for various chemicals and chemical products valued at almost \$14.4 million. Its principal defense customer was the U.S. Army.

**Table 6.9**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Poly Scientific Research and Development Corporation**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Misc. Chemical Specialties	12,790	Army	12,727	Production	14,386
Other	1,596	Navy	1,441	Total	14,386
<b>Total</b>	<b>14,386</b>	Defense Agencies	218		
		<b>Total</b>	<b>14,386</b>		

Source: DMS Marketing Service

**BK Equipment and Supply Company, Inc.** This firm is located in Hauppauge and employs approximately 12 persons and occupies 1,600 square feet. It produces electronic control, detection and communications equipment for military use. During the fiscal 1984 through 1986 period, the firm received defense prime contract awards valued at about \$15.0 million. The largest awards were for the production of telephone and telegraph equipment. The firm's principal defense customer was the U.S. Army.

**Table 6.10**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**BK Equipment and Supply Company, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Telephone & Telegraph Equipment	7,883	Army	11,612	Production	15,016
Misc. Communications Equipment	3,366	Air Force	3,404	Total	15,016
Radio & TV Communications Equip.	1,932	<b>Total</b>	<b>15,016</b>		
Other	1,835				
<b>Total</b>	<b>15,016</b>				

Source: DMS Marketing Service



**Rodale Electronics, Inc.** Rodale Electronics is located in Garden City. It employs 96 workers and occupies 50,000 square feet of floor space. The firm produces electrical devices and systems. During the fiscal 1984-86 period, the firm received prime contract awards valued at almost \$10.7 million. These awards were for production of electronic countermeasures equipment, airborne radio navigation equipment, telephone and telegraph equipment and for the maintenance and repair of such equipment. The firm's principal defense customer was the U.S. Navy, although it also received substantial awards from both the Army and the Air Force.

**Table 6.11**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Rodale Electronics, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Electronic Countermeasures Equipment	1,748	Army	2,277	Maintenance/Repair	2,527
Maintenance/Repair of Equipment	2,527	Navy	5,727	Production	8,157
Radio Navigation Equip., Airborne	2,011	Air Force	1,974	<b>Total</b>	<b>10,684</b>
Telephone & Telegraph Equipment	1,403	Defense Agencies	706		
Other	2,995	<b>Total</b>	<b>10,684</b>		
<b>Total</b>	<b>10,684</b>				

Source: DMS Marketing Service

**General Aero Products Corporation.** General Aero Products is located in Copiague. It employs 305 persons and occupies 45,000 square feet of floor space. The Company produces aircraft instrumentation, electro-mechanical and electro-optical parts. During the fiscal 1984 through 1986 period, the Company received defense prime contract awards valued at more than \$24 million. This includes several awards for the production of engine instruments. The firm's principal defense customers were the Army and the Air Force.

**Table 6.12**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**General Aero Products Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Engine Instruments	11,839	Army	9,639	Maintenance/Repair	27
Fire Control Radar Equipment	1,087	Navy	851	Production	24,226
Head & Handsets Microphone Speakers	2,119	Air Force	10,974	<b>Total</b>	<b>24,253</b>
Temperature & Humidity Measuring Instruments	2,407	Defense Agencies	2,789		
Other	6,801	<b>Total</b>	<b>24,253</b>		
<b>Total</b>	<b>24,253</b>				

Source: DMS Marketing Service



**Amperex Electronic Corporation.** Amperex is located in Hicksville. It employs approximately 160 persons and occupies approximately 130,000 square feet of floor space. It produces electron tubes and components. During the fiscal 1984 through 1986 period, it received defense prime contract awards totaling more than \$10.8 million for the production of electron tubes and associated hardware. The defense agencies were its principal defense customer.

**Table 6.13**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Amperex Electronic Corporation**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Electron Tubes & Associated Hardware	10,781	Navy	1,393	Production	10,854
Other	73	Air Force	339	Total	10,854
		Defense Agencies	9,122		
<b>Total</b>	<b>10,854</b>	<b>Total</b>	<b>10,854</b>		

Source: DMS Marketing Service

**Aerospace Avionics, Inc.** Aerospace Avionics is located in Bohemia, where it employs approximately 500 persons and occupies 93,000 square feet of floor space. It is a producer of electronic test equipment and aircraft subsystems. During the fiscal 1984 through 1986 period, it received defense prime contract awards valued at more than \$12.6 million. The largest awards were for the production of electrical power conversion equipment. The firm's principal defense customers were the Air Force and the Navy.

**Table 6.14**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Aerospace Avionics, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Electrical Power Conversion Equipment	8,801	Army	99	Production	12,638
Misc. Aircraft Accessories		Navy	4,256	Total	12,638
& Components	1,415	Air Force	7,740		
Other	2,422	Defense Agencies	543		
<b>Total</b>	<b>12,638</b>	<b>Total</b>	<b>12,638</b>		

Source: DMS Marketing Service



**Gull Airborne Instruments, Inc.** Gull is located in Smithtown. It employs approximately 1,250 persons and occupies some 120,000 square feet of floor space. The Company manufactures aircraft parts and liquid gauging instruments. It was recently acquired by the Parker Hannifin Corporation of Cleveland, Ohio. During the fiscal 1984 through 1986 period, the firm received defense prime contracts valued at almost \$22 million. The largest awards were for the production of flow, level and motion measuring instruments and for engine instruments. Gull's major defense customers were the Navy and the Air Force.

**Table 6.15**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Gull Airborne Instruments, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Engine Instruments	4,567	Army	1,192	Production	21,556
Flow, Level, Motion Measuring Instruments	11,080	Navy	8,944	Total	21,556
Other	5,909	Air Force	9,918		
		Defense Agencies	1,502		
<b>Total</b>	<b>21,556</b>	<b>Total</b>	<b>21,556</b>		

Source: DMS Marketing Service

**Numax Electronics, Inc.** Numax Electronics is located in Hauppauge. It employs some 300 persons and occupies approximately 40,000 square feet of floor space. It is a producer of electronic systems and equipment, electromechanical devices and night vision equipment. During the fiscal 1984 through 1986 period, the Company received prime contract awards valued at almost \$12.7 million. The largest awards were for night vision equipment and for electronic and communications equipment engineering development. The firm's principal defense customer was the U.S. Army.

**Table 6.16**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Numax Electronics, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Electronic & Communications Equipment Engineering Development	7,057	Army	12,196	Research & Development	7,057
Night Vision Equipment	3,386	Navy	241	Maintenance/Repair	50
Radio & TV Communications Equipment, except Airborne	1,271	Air Force	253	Production	5,583
Other	976	<b>Total</b>	<b>12,690</b>	<b>Total</b>	<b>12,690</b>
<b>Total</b>	<b>12,690</b>				

Source: DMS Marketing Service



**Arkwin Industries, Inc.** Arkwin Industries is located in Westbury. It employs 430 persons and occupies some 110,000 square feet of floor space. It is a producer of aircraft valves and accessories. The Company received prime contract awards of almost \$14.2 million during the fiscal 1984 through 1986 period. These awards entailed the production of aircraft hydraulic vacuum and deicing systems, aircraft landing gear components, valves, aircraft engine fuel system components and power and hand pumps. The Air Force was the firm's principal defense customer.

**Table 6.17**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Arkwin Industries, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Aircraft Hydraulic Vacuum & Deicing Systems	3,578	Army	1,337	Maintenance/Repair	72
Aircraft Landing Gear Components	1,839	Navy	4,302	Production	14,125
Engine Fuel System Components, Aircraft	1,082	Air Force	7,893		
Misc. Engine Accessories, Aircraft	2,100	Defense Agencies	665	<b>Total</b>	<b>14,197</b>
Power & Hand Pumps	1,061	<b>Total</b>	<b>14,197</b>		
Valves, Powered & Non-Powered	2,030				
Other	2,507				
<b>Total</b>	<b>14,197</b>				

Source: DMS Marketing Service

**Centroid, Inc.** Centroid, Inc. is located in Syosset. It employs some 45 persons and occupies 24,000 square feet of floor space. The Company produces electronic countermeasures equipment, fire control radar equipment and remote control systems. During the fiscal 1984 through 1986 period, it received defense prime contract awards totaling almost \$15.7 million. This included several large awards for production of electronic countermeasures equipment and missile remote control systems. The firm's principal defense customer was the U.S. Air Force.

**Table 6.18**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Centroid, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Electronic Countermeasures Equip.	4,187	Navy	3,676	Production	15,659
Fire Control Radar Equip.	1,103	Air Force	8,888		
Missile Remote Control Systems	3,258	Defense Agencies	3,095	<b>Total</b>	<b>15,659</b>
Other	7,111	<b>Total</b>	<b>15,659</b>		
<b>Total</b>	<b>15,659</b>				

Source: DMS Marketing Service



**GAP Instrument Corporation.** GAP Instrument Corporation is located in Hauppauge. It employs approximately 24 workers and occupies about 17,500 square feet of floor space. As such, it was one of the smaller firms in the sample. The Company produces navigational instruments, fire control computing sights and devices and photographic equipment. During the fiscal 1984 through 1986 period, the firm received prime contract awards totaling \$1.65 million. The Navy was its largest defense customer.

**Table 6.19**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**GAP Instrument Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Navigational Instruments	266	Army	416	Research & Development	33
Fire Control Computing		Navy	1,033	Production	1,621
Sights and Devices	376	Air Force	33	<b>Total</b>	<b>1,654</b>
Photographic Equip. & Accessories	416	Defense Agencies	172		
Other	596	<b>Total</b>	<b>1,654</b>		
<b>Total</b>	<b>1,654</b>				

Source: DMS Marketing Service

**Labred Electronics Corporation.** Labred Electronics is located in Bohemia. It employs some 30 workers and occupies 5,000 square feet. It is one of the smaller firms in the sample. Labred is a producer of solid state devices. Between fiscal 1984 and fiscal 1986, the Company received defense prime contracts totaling \$1.8 million. Its business was almost equally divided among the Army, Navy and the Air Force.

**Table 6.20**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Labred Electronics**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Aircraft Maintenance/Repair Equip.	447	Army	657	Architectural/Engineering	
Electronic Countermeasures Equip.	429	Navy	525	Services	69
Misc. Communications Equipment	149	Air Force	577	Production	1,754
Other	798	Defense Agencies	64	<b>Total</b>	<b>1,823</b>
<b>Total</b>	<b>1,823</b>	<b>Total</b>	<b>1,823</b>		

Source: DMS Marketing Service



**Modular Devices, Inc.** Modular Devices is located in Shirley. It employs some 50 persons and occupies approximately 20,000 square feet of floor space. It produces electronic countermeasures equipment and remote control systems. During the fiscal 1984 through 1986 period, it was awarded defense prime contracts totaling \$6.4 million, primarily from the Army.

**Table 6.21**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Modular Devices, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Launchers, Guided Missile	1,103	Army	3,928	Production	6,430
Electronic Countermeasures Equip.	915	Navy	646	Total	6,430
Missile Remote Control Systems	1,130	Air Force	1,775		
Other	3,282	Defense Agencies	81		
<b>Total</b>	<b>6,430</b>	<b>Total</b>	<b>6,430</b>		

Source: DMS Marketing Service

**Lordship Industries, Inc.** Lordship Industries is located in Hauppauge. It employs approximately 100 persons and occupies some 30,000 square feet. The Company produces military clothing, badges and insignia. During the fiscal 1984 through 1986 period, the Company received defense prime contract awards totaling \$12.2 million. The preponderance of these awards were for clothing, individual equipment and insignia which were purchased by various U.S. defense agencies.

**Table 6.22**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Lordship Industries, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Badges, Insignia, Clothing	11,855	Defense Agencies	12,225	Production	12,225
Other	370	Total	12,225	Total	12,225
<b>Total</b>	<b>12,225</b>				

Source: DMS Marketing Service



**MGR Equipment Corporation.** MGR Equipment is located in Inwood. It employs 25 persons and occupies approximately 45,000 square feet of plant space. The firm manufactures refrigeration equipment. During the fiscal 1984 through 1986 period, the Company received defense prime contract awards totaling \$5.9 million, primarily for the production of self-contained refrigeration units and accessories. The firm's principal defense customer was the U.S. Army.

**Table 6.23**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**MGR Equipment Corporation**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Refrigeration Units & Accessories	5,576	Army	3,326	Production	5,910
Other	334	Navy	453	Total	5,910
		Air Force	308		
<b>Total</b>	<b>5,910</b>	Defense Agencies	1,823		
		<b>Total</b>	<b>5,910</b>		

Source: DMS Marketing Service

**North Atlantic Industries, Inc.** North Atlantic Industries is located in Hauppauge. It employs approximately 340 persons and occupies 66,000 square feet of floor space. The firm produces electronic countermeasures equipment. During the fiscal 1984 through 1986 period, it received defense contracts totaling \$44.4 million, primarily for the production of electronic countermeasures equipment. The Navy was the firm's largest defense customer.

**Table 6.24**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**North Atlantic Industries, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Electronic Countermeasures Equipment	29,236	Navy	42,790	Architectural/Engineering Services	1,801
Sound, Record & Reproducing Equipment	5,405	Air Force	1,268	Training Services	1,825
Other	9,791	Defense Agencies	374	Production	40,806
<b>Total</b>	<b>44,432</b>	<b>Total</b>	<b>44,432</b>	<b>Total</b>	<b>44,432</b>

Source: DMS Marketing Service



**Orbit Instrument Company.** Orbit Instrument is located in Hauppauge. It has approximately 170 employees and occupies 72,000 square feet. It is a producer of electro-mechanical assemblies and instruments, keyboard assemblies, electronic systems, data entry and display systems and military hardware. During the fiscal 1984-86 period, the Company received defense prime contracts valued at \$3 million. The awards were made for the production of non-airborne radar equipment, microelectronic circuit devices, fire control computing sights and devices and miscellaneous communications equipment. The firm's principal customer was the U.S. Navy.

**Table 6.25**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Orbit Instrument Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Radar Equipment, except Airborne	981	Navy	2,615	Production	3,009
Microelectronic Circuit Devices	349	Air Force	56	<b>Total</b>	<b>3,009</b>
Electrical Control Equipment	143	Defense Agencies	338		
Misc. Communications Equipment	316	<b>Total</b>	<b>3,009</b>		
Fire Control Computing Sights & Devices	235				
Other	985				
<b>Total</b>	<b>3,009</b>				

Source: DMS Marketing Service

**Telemechanics, Inc.** Telemechanics is located in Bay Shore. It employs approximately 70 persons and occupies some 50,000 square feet of plant space. It is a producer of new and rebuilt teletype equipment. During the fiscal 1984 through 1986 period, the firm received defense prime contracts totaling \$3.8 million. These awards were primarily for the production of teletype and facsimile equipment for the defense agencies.

**Table 6.26**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Telemechanics, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Teletype & Facsimile Equipment	3,241	Army	139	Production	3,810
Other	569	Navy	163	<b>Total</b>	<b>3,810</b>
		Air Force	135		
<b>Total</b>	<b>3,810</b>	Defense Agencies	3,373		
		<b>Total</b>	<b>3,810</b>		

Source: DMS Marketing Service



**PTE, Inc.** PTE, Inc. is located in Copiague. It employs approximately 26 persons and occupies some 10,000 square feet of floor space. It is a producer of military fire control products. During the fiscal 1984 through 1986 period, the firm received defense prime contracts valued at more than \$2.2 million. These awards were made for the production of optical sighting and ranging equipment, guns and miscellaneous fire control equipment. The firm's principal defense customer was the U.S. Army.

**Table 6.27**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**PTE, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Misc. Fire Control Equip.	354	Army	1,581	Production	2,242
Optical Sighting & Ranging Equip.	424	Navy	333	Total	2,242
Torpedo Inert Components	237	Air Force	328		
Guns, through 30MM	377	Total	2,242		
Other	850				
<b>Total</b>	<b>2,242</b>				

Source: DMS Marketing Service

**Robotic Vision Systems, Inc.** Robotic Vision Systems is located in Hauppauge. It employs approximately 150 persons and occupies approximately 65,000 square feet of space. The Company produces three-dimensional robotic vision systems. During the fiscal 1984-86 period, it received defense prime contract awards totaling almost \$12.2 million. The awards were made both for engineering and technical services and for the production of torpedo maintenance repair equipment. The firm's principal defense customer was the U.S. Navy.

**Table 6.28**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Robotic Vision Systems, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Engineering/Technical Services	2,041	Navy	12,049	Research & Development	637
Torpedo Maintenance Repair Equip.	2,577	Air Force	125	Expert Consulting Services	79
Miscellaneous Items	4,991	Total	12,174	Architectural/Engineering	
Other	2,565			Services	2,166
<b>Total</b>	<b>12,174</b>			Production	9,292
				<b>Total</b>	<b>12,174</b>

Source: DMS Marketing Service



**U.S. Dynamics Corporation.** U.S. Dynamics Corporation is located in Amityville. It employs approximately 170 persons and occupies 50,000 square feet of floor space. The firm produces radio communications equipment, microwave devices and semiconductor fabrication equipment. During the fiscal 1984 through 1986 period, U.S. Dynamics received defense prime contract awards totaling \$11.4 million. The largest awards were for the production of fire control stabilizing mechanisms and missile remote control systems and for the maintenance and repair of communications and other equipment. The firm's principal defense customer was the U.S. Air Force.

**Table 6.29**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**U.S. Dynamics Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Fire Control Stabilizing Mechanisms	1,454	Army	42	Maintenance/Repair	3,192
Flight Instruments	820	Navy	1,984	Production	8,226
Maintenance/Repair of Communications Equip.	882	Air Force	9,392	<b>Total</b>	<b>11,418</b>
Maintenance/Repair of Equipment,		<b>Total</b>	<b>11,418</b>		
Guided Missiles	1,764				
Missile Remote Control Systems	2,117				
Other	4,381				
<b>Total</b>	<b>11,418</b>				

Source: DMS Marketing Service

**Weksler Instrument Corporation.** Weksler Instrument is located in Freeport. The Company employs more than 200 persons and occupies approximately 150,000 square feet of floor space. It produces recording instruments, pressure gauges and thermometers. During the fiscal 1984-86 period it received defense prime contract awards totaling almost \$3.5 million for the production of temperature and humidity measuring instruments. These instruments were sold primarily to the various defense agencies.

**Table 6.30**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Weksler Instruments Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Temperature & Humidity		Navy	30	Production	3,448
Measuring Instruments	3,448	Defense Agencies	3,418	<b>Total</b>	<b>3,448</b>
<b>Total</b>	<b>3,448</b>	<b>Total</b>	<b>3,448</b>		

Source: DMS Marketing Service



**Tempo Instruments, Inc.** Tempo Instruments is located in Commack. It employs about 200 persons and occupies 51,000 square feet of space. It is a producer of electronic timers, programmers and controls. During the fiscal 1984-86 period, the Company received defense prime contract awards of almost \$2.9 million for the production of navigational instruments, electrical control equipment and electrical power conversion equipment. Its defense customers included the various defense agencies, the Navy and the Air Force.

**Table 6.31**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Tempo Instruments, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Navigational Instruments	334	Navy	680	Production	2,896
Electrical Control Equipment	533	Air Force	679	Total	2,896
Electrical Power Conversion Equip.	604	Defense Agencies	1,537		
Other	1,425	Total	2,896		
<b>Total</b>	<b>2,896</b>				

Source: DMS Marketing Service

**RHG Electronics Laboratory.** RHG Electronics is located in Deer Park. It employs approximately 240 persons and occupies 24,000 square feet of floor space. It is a producer of microwave components and equipment. During the fiscal 1984 through 1986 period, the firm received defense prime contracts totaling more than \$3.3 million. These awards were for the production of non-airborne radar equipment and fire control radar equipment, non-airborne radio and TV communications equipment and miscellaneous communications equipment. The U.S. Navy was the firm's principal defense customer.

**Table 6.32**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**RHG Electronics Laboratory, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Fire Control Radar Equipment, except Airborne	365	Army	148	Production	3,347
Radar Equipment, except Airborne	612	Navy	2,160	Total	3,347
Misc. Communications Equipment	819	Air Force	878		
Radio & TV Communications Equipment, except Airborne	596	Defense Agencies	161		
Other	955	Total	3,347		
<b>Total</b>	<b>3,347</b>				

Source: DMS Marketing Service



**Inscom Electronics Corporation.** Inscom Electronics is located in Freeport. It employs about 50 persons and occupies approximately 6,000 square feet of floor space. It produces control systems and other electronic and electro-mechanical equipment. During the fiscal 1984-86 period, the firm received defense prime contracts valued at \$3.0 million. The largest awards were for missile remote control systems and missile maintenance equipment. The firm's principal defense customer was the U.S. Army.

**Table 6.33**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Inscom Electronics Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Missile Remote Control Systems	865	Army	2,940	Production	3,011
Missile Maintenance Equipment	1,129	Defense Agencies	71	Total	3,011
Miscellaneous Communications Equipment	226	Total	3,011		
Microelectronic Circuit Devices	82				
Other	709				
<b>Total</b>	<b>3,011</b>				

Source: DMS Marketing Service

**Astrodyne, Inc.** Astrodyne is located in Oceanside. It is a small firm employing approximately six workers and occupying about 5,000 square feet of floor space. It produces drafting, surveying and mapping instruments as well as laboratory equipment and supplies. During the fiscal 1984-86 period, it received defense prime contract awards of more than \$1.0 million for the production of these items. Its principal defense customers were the U.S. Army and the various defense agencies.

**Table 6.34**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Astrodyne, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Drafting, Surveying & Mapping Instruments	258	Army	304	Production	1,027
Laboratory Equipment & Supplies	294	Navy	40	Total	1,027
Other	475	Air Force	70		
		Defense Agencies	613		
<b>Total</b>	<b>1,027</b>	<b>Total</b>	<b>1,027</b>		

Source: DMS Marketing Service



**CF Electronics, Inc.** CF Electronics is located in Commack. It employs approximately 125 persons and occupies 20,000 square feet of floor space. The firm produces various types of electronic equipment, test equipment and instrumentation. During the fiscal 1984-86 period, the firm received prime contract awards totaling \$15.6 million. These awards were for the production of electronic countermeasures equipment, intercom and public address systems, electrical power conversion equipment, safety and rescue equipment and telephone and telegraph equipment. The firm's principal defense customer was the U.S. Army, but the Company also produced equipment for the Navy and the Air Force.

**Table 6.35**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**CF Electronics, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Electronic Countermeasures Equip.	1,185	Army	8,510	Production	15,583
Intercom & Public Address Systems,		Navy	3,108	Total	15,583
except Airborne	1,553	Air Force	3,909		
Power Conversion Equipment, Electrical	2,659	Defense Agencies	56		
Safety & Rescue Equipment	2,367	Total	15,583		
Telephone & Telegraph Equip.	1,992				
Other	5,827				
<b>Total</b>	<b>15,583</b>				

Source: DMS Marketing Service

**F & H Manufacturing Corporation.** The F & H Manufacturing Corporation is located in Hauppauge. It employs 135 persons and occupies 140,000 square feet of floor space. The Company produces broadcast antennas, communications and microwave equipment, floodlights, spotlights and electronic assemblies. During the fiscal 1984-86 period, the Company received defense prime contract awards of close to \$17.1 million for the production of tents and tarpaulins, construction equipment, antenna waveguards and non-airborne radio and TV communications equipment. The firm's principal defense customers were the various defense agencies and the U.S. Army.

**Table 6.36**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**F & H Manufacturing Corporation**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Tents & Tarpaulins	2,481	Army	4,671	Production	17,067
Miscellaneous Construction Equip.	2,079	Navy	390	Total	17,067
Antenna Waveguards & Related Equipment	3,227	Air Force	91		
Radio & TV Communications		Defense Agencies	11,915		
Equipment, except Airborne	2,071	Total	17,067		
Other	7,209				
<b>Total</b>	<b>17,067</b>				

Source: DMS Marketing Service



**General Microwave Corporation.** General Microwave is located in Amityville. It employs some 270 persons and occupies approximately 27,500 square feet of floor space. The Company produces electric and electronic measuring and testing instruments, antenna waveguards and miscellaneous communications equipment. During the fiscal 1984-86 period, the firm received defense prime contracts totaling more than \$4.0 million. The largest awards were made for the production of electric and electronic measuring and testing instruments. The firm's principal defense customers were the U.S. Army and Navy.

**Table 6.37**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**General Microwave Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Electric and Electronic Measuring & Testing Instruments	2,131	Army	1,636	Production	4,024
Miscellaneous Communications Equipment	907	Navy	1,557	<b>Total</b>	<b>4,024</b>
Antenna Waveguards & Related Equipment	266	Air Force	611		
Other	720	Defense Agencies	220		
<b>Total</b>	<b>4,024</b>	<b>Total</b>	<b>4,024</b>		

Source: DMS Marketing Service

**Logimetrics, Inc.** Logimetrics is located in Plainview. It employs about 63 persons and occupies 22,000 square feet of floor space. It produces electronic measuring and testing instruments and other communications equipment. During the fiscal 1984-86 period, the firm received defense prime contract awards exceeding \$4.2 million, primarily for the production of electronic measuring and testing instruments and various types of communications equipment. Its principal defense customers were the U.S. Air Force and Navy.

**Table 6.38**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Logimetrics, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Electric & Electronic Measuring & Testing Instruments	1,035	Army	53	Research & Development	53
Miscellaneous Communications Equipment	1,086	Navy	1,380	Production	4,165
Other	2,097	Air Force	2,785	<b>Total</b>	<b>4,218</b>
<b>Total</b>	<b>4,218</b>	<b>Total</b>	<b>4,218</b>		

Source: DMS Marketing Service



**Inso Electronic Products, Inc.** Inso is a small firm located in Roosevelt. It employs approximately 24 persons and occupies 18,000 square feet of floor space. The firm produces teflon insulated wire and cable. During the fiscal 1984-86 period, it received defense prime contract awards totaling almost \$2.6 million for the production of guns, various aircraft accessories and components and ammunition and explosives, among other products. Its principal defense customer was the U.S. Army.

**Table 6.39**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Inso Electronic Products, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Guns, Through 30MM	959	Army	2,129	Production	2,568
Misc. Aircraft Accessories & Components	582	Air Force	228	Total	2,568
Misc. Vehicular Components	294	Defense Agencies	211		
Demolition Materials	251	Total	2,568		
Other	482				
<b>Total</b>	<b>2,568</b>				

Source: DMS Marketing Service

**Autotronic Products, Inc.** Autotronic Products is located in Oceanside. It employs approximately eight persons. During the fiscal 1984 through 1986 period, the firm received defense prime contract awards of more than \$2.4 million, primarily for production of vehicle maintenance and repair shop equipment. Its principal defense customer was the U.S. Army.

**Table 6.40**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Autotronic Products, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Vehicle Maintenance & Repair		Army	1,225	Production	2,436
Shop Equipment	1,130	Navy	667	Total	2,436
Miscellaneous Communications Equipment	309	Air Force	148		
Electrical Control Equipment	242	Defense Agencies	396		
Other	755	Total	2,436		
<b>Total</b>	<b>2,436</b>				

Source: DMS Marketing Service



**Bren-tronics, Inc.** Bren-tronics is located in Commack. It employs 90 persons and occupies approximately 33,000 square feet of floor space. The firm produces primary and secondary batteries. During the fiscal 1984 through 1986 period, it received prime contract awards totaling \$9.2 million, primarily from the U.S. Army, for the production of these items.

**Table 6.41**

**A Profile of Defense Awards, Fiscal 1984 Through 1986**

**Bren-tronics, Inc.**  
(\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Batteries, Primary	6,513	Army	7,822	Production	9,205
Batteries, Secondary	2,666	Navy	453	<b>Total</b>	<b>9,205</b>
Other	26	Air Force	139		
<b>Total</b>	<b>9,205</b>	Defense Agencies	791		
		<b>Total</b>	<b>9,205</b>		

Source: DMS Marketing Service

**Dyna-Empire, Inc.** Dyna-Empire is located in Garden City. It employs approximately 175 persons and occupies 45,000 square feet of floor space. It is a producer of aircraft engine sub-assemblies and underwater sound equipment. During the fiscal 1984-86 period, the firm received defense prime contract awards totaling \$4.0 million. These awards were made for the production of aircraft engine fuel system components, aircraft gas turbine jet engines, temperature and humidity measuring instruments and underwater sound equipment. The firm's principal defense customer was the U.S. Air Force.

**Table 6.42**

**A Profile of Defense Awards, Fiscal 1984 Through 1986**

**Dyna-Empire, Inc.**  
(\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Engine Fuel System Components, Aircraft	531	Navy	982	Production	4,028
Gas Turbine Jet Engines, Aircraft	1,807	Air Force	2,730	<b>Total</b>	<b>4,028</b>
Temperature & Humidity Measuring Instruments	450	Defense Agencies	316		
Underwater Sound Equipment	532	<b>Total</b>	<b>4,028</b>		
Other	708				
<b>Total</b>	<b>4,028</b>				

Source: DMS Marketing Service



**General Applied Science Labs, Inc.** This firm is located in Westbury. It employs about 20 persons and occupies 10,000 square feet of floor space. It performs scientific research, development and testing. During the fiscal 1984-86 period, the firm received government prime contract awards totaling almost \$4.7 million. Its principal customers were NASA and the U.S. Air Force. These contracts were awarded for aeronautical and space technical research and development, other defense operations systems development and other defense exploratory development.

**Table 6.43**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**General Applied Science Labs, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Aeronautical & Space Research & Development	1,990	Air Force	2,687	Research & Development	4,677
Other Defense Operations Systems Development	705	NASA	1,990	<b>Total</b>	<b>4,677</b>
Other Defense Exploratory Development	1,211	<b>Total</b>	<b>4,677</b>		
Other	771				
<b>Total</b>	<b>4,677</b>				

Source: DMS Marketing Service

**Schenck Trebel Corporation.** This firm is located in Deer Park. It employs some 125 persons and occupies approximately 23,000 square feet of space. It is a producer of dynamic and static balancing machines. During the fiscal 1984 through 1986 period, the Corporation received prime contract awards totaling \$2.0 million, primarily for production of scales and balances and other physical properties testing equipment. The firm's principal customer was the U.S. Navy.

**Table 6.44**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Schenck Trebel Corporation**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Physical Properties Testing Equipment	1,021	Navy	1,526	Production	2,016
Scales & Balances	463	Air Force	490	<b>Total</b>	<b>2,016</b>
Miscellaneous Instruments	290	<b>Total</b>	<b>2,016</b>		
Other	242				
<b>Total</b>	<b>2,016</b>				

Source: DMS Marketing Service



**Trans World Optics, Inc.** Trans World Optics is located in Hauppauge. It employs approximately 50 persons and occupies 15,000 square feet of floor space. The firm produces optical components for fire control units. During the fiscal 1984 through 1986 period, Trans World Optics received defense prime contracts totaling about \$2.3 million. These awards were made for the production of optical sighting and ranging equipment, night vision equipment and guided missile launchers, among other products. The firm's principal defense customer was the U.S. Army.

**Table 6.45**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Trans World Optics, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Launchers, Guided Missile	354	Army	1,669	Production	2,306
Optical Sighting & Ranging Equip.	892	Navy	160	<b>Total</b>	<b>2,306</b>
Night Vision Equipment	296	Air Force	381		
Other	764	Defense Agencies	96		
<b>Total</b>	<b>2,306</b>	<b>Total</b>	<b>2,306</b>		

Source: DMS Marketing Service

**Bruno-New York Industries Corporation.** Bruno-New York Industries is located in Farmingdale. It employs approximately 65 persons and occupies 20,000 square feet of space. It produces electronic equipment, test equipment and instrumentation. During the fiscal 1984-86 period, it received defense prime contract awards worth almost \$1.5 million. These awards were made for the production of airborne public address systems, head and handsets microphone speakers, and electronic countermeasures equipment, among other products. The firm's defense work was almost equally divided among the Navy, the Air Force and the defense agencies.

**Table 6.46**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Bruno-New York Industries Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Electronic Countermeasures Equip.	217	Navy	542	Production	1,456
Head & Handsets Microphone Speakers	364	Air Force	418	<b>Total</b>	<b>1,456</b>
Public Address Systems , Airborne	104	Defense Agencies	496		
Other	771	<b>Total</b>	<b>1,456</b>		
<b>Total</b>	<b>1,456</b>				

Source: DMS Marketing Service



**Comtech Telecommunications Corporation.** Comtech Telecommunications is located in Hauppauge. It produces high-technology communications equipment. During the fiscal 1984 through 1986 period, the firm received defense prime contract awards totaling \$21.4 million. These awards were primarily for the production of radio and TV communications equipment and other communications equipment. The firm's principal defense customer was the U.S. Army.

**Table 6.47**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Comtech Telecommunications Corporation**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Maintenance/Repair of Electronic Equipment	459	Army	20,863	Research & Development	729
Misc. Communications Equipment	9,868	Air Force	495	Maintenance/Repair	573
Radio & TV Communications Equipment, except Airborne	10,218	Defense Agencies	67	Production	20,123
Other	880	<b>Total</b>	<b>21,425</b>	<b>Total</b>	<b>21,425</b>
<b>Total</b>	<b>21,425</b>				

Source: DMS Marketing Service

**Venus Scientific, Inc.** Venus Scientific is located in Farmingdale. It employs 480 persons and occupies 63,000 square feet of space. The Company produces high voltage power supplies. During the fiscal 1984-86 period, the firm received defense prime contracts totaling more than \$7.9 million. Most were for the production of electronic countermeasures equipment, airborne radio and TV communications equipment and other communications equipment. The firm produced primarily for the Air Force but it also had substantial Navy contracts.

**Table 6.48**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Venus Scientific, Inc.**  
 (\$000)

Program	Amount	Source	Amount	Type of Contract	Amount
Electronic Countermeasures Equip.	2,951	Navy	2,816	Maintenance/Repair	89
Miscellaneous Communications Equipment	1,495	Air Force	5,074	Production	7,870
Radio & TV Communications Equipment, Airborne	1,211	Defense Agencies	69	<b>Total</b>	<b>7,959</b>
Other	2,302	<b>Total</b>	<b>7,959</b>		
<b>Total</b>	<b>7,959</b>				

Source: DMS Marketing Service



**Cardwell Condenser Corporation.** Cardwell Condenser is located in Lindenhurst. It employs about 125 people and occupies 40,000 square feet of floor space. The firm produces transistorized power supplies. During fiscal years 1984 through 1986, the Company received defense prime contract awards valued at almost \$2.2 million. These awards were made for the production of antenna waveguides, meteorological instruments, telephone and telegraph equipment and underwater sound equipment. The firm's defense customers included the Army, Navy, Air Force and the defense agencies.

**Table 6.49**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Cardwell Condenser Corporation**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Antenna Waveguides & Related Equipment	1,004	Army	427	Production	2,185
Meteorological Instruments & Apparatus	318	Navy	986	Total	2,185
Telephone & Telegraph Equipment	232	Air Force	230		
Underwater Sound Equipment	123	Defense Agencies	542		
Other	508	Total	2,185		
Total	2,185				

Source: DMS Marketing Service

**Check-Mate Industries, Inc.** Check-Mate Industries is located in Wyandanch. It employs approximately 45 persons and occupies about 24,000 square feet of floor space. It performs contract machining and metal stamping. During the fiscal 1984 through 1986 period, the firm received prime contract awards totaling more than \$7.3 million. These awards were made by the Army, primarily for the production of weapons.

**Table 6.50**  
**A Profile of Defense Awards, Fiscal 1984 Through 1986**  
**Check-Mate Industries, Inc.**  
**(\$000)**

Program	Amount	Source	Amount	Type of Contract	Amount
Guns, Through 30MM	5,116	Army	6,823	Production	7,327
Other	2,211	Air Force	216	Total	7,327
Total	7,327	Defense Agencies	288		
		Total	7,327		

Source: DMS Marketing Service



## CONCLUSIONS

### The Expertise of Long Island's Smaller Defense Firms

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Long Island's smaller defense firms possess skills covering a broad spectrum of defense-related technologies. A total of eighty smaller firms were analyzed. Among these firms, the largest contracts were for fuses and primers, fixed wing aircraft, airframe structural components, electronic countermeasures equipment and miscellaneous communications equipment. However, the output of these firms spanned the full range of Defense Department needs. Contracts were awarded for electronic measuring and testing instruments, radar equipment, underwater sound equipment, badges and insignia, guns, batteries, ADP equipment, guided missile launchers, cameras, power and hand pumps, laboratory equipment and vehicular components, among others. Contracts were awarded not only for the production of new equipment but

also for the repair of existing equipment, for research and development, architectural and engineering services, expert consulting services and training services. The weapons systems on which these companies worked included the A-10, the P-3 Orion, the F-4 Phantom II, the F-16, the F-14 Tomcat, the C-130 Hercules, the F-18 Hornet, the B-52 Strato Fortress, the M48 Tank, the F-15 Eagle, the F-111, the M-60 Combat 105MM Gun, the A-6 Intruder, the C-5 Galaxy, the T-38 Talon, the AN/SPS-52 Radar, the SH-60 Seahawk, the H-46 Sea Knight, the A-7 Corsair II, the 7.62MM rifle M14, the MIM-14 Nike Hercules and the F-8 Crusader, to name a few.

Clearly, Long Island's smaller defense firms represent a valuable resource. Their expertise is vital to the Long Island economy and to the U.S. defense establishment. Policies are needed to safeguard that expertise and to preserve the economic viability of Long Island's smaller defense firms should the business prospects of Long Island's large prime contractors deteriorate.







## CHAPTER 7...

# LONG ISLAND'S DEFENSE INDUSTRY WORKFORCE:

## Characteristics and Future Employment Opportunities

This chapter describes the characteristics of the workforce within five major Long Island defense firms: Grumman, Unisys, Harris, Hazeltine and Eaton/AIL. It focuses primarily on worker occupations, age, length of service with firm and educational attainment. This information was provided by personnel officers within each firm. The analysis seeks to determine to what extent the current defense industry skill base can satisfy the future occupational needs of Long Island employers or serve as an inducement to outside firms to locate on Long Island. This chapter presents aggregate findings for all five defense firms. In some cases, the individual firms provided information about a sample of their workforce, not the complete workforce.

### CHARACTERISTICS of the WORKFORCE

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**Occupations.** The occupational distribution of workers within Long Island's major defense firms as of 1987 was considerably different from the occupational mix of Long Island's total resident labor force as shown in the 1980 decennial census. Approximately 37% of the defense industry workers were professionals, primarily engineers. Fewer than 16% of those within Long Island's resident labor force were professionals. Technicians were also overrepresented in the defense industry labor force. For purposes of analysis, this category was defined to include electrical technicians, engineering technicians, drafters and computer programmers. These occupational groups accounted for 12.6% of the defense industry labor force but comprised only 1.8% of the total resident labor force. Factory assemblers were also more highly represented in the defense industry labor force than in the general resident labor force: 14.0% versus 6.0%. This confirms the fact that the defense industry is a major source of factory jobs on Long Island.



By contrast, salespersons were underrepresented in the defense industry labor force. They accounted for 12.0% of the resident labor force but for less than 0.05% of the defense industry labor force. Few job titles provided by the five firms referenced sales, marketing or advertising. Defense firms generally market a preponderance of their products to the Federal government. Preparing the necessary technical documentation, making the essential technical presentations and developing the actual terms of such contracts require a staff of engineers as well as legal and financial specialists. The professional nature of these jobs tends to be reflected in their job titles. For example, a *documentation-specialist engineer* may prepare the technical documentation for a proposed project. In reality, this may be a sales function since its aim is to convince the government to buy the proposal. The technical nature of the task, however, requires expertise in engineering, which makes it a professional level job.

Service workers were also underrepresented in the defense industry labor force. They accounted for 13.1% of the Long Island resident labor force but for only 3.4% of the defense industry labor force. Clerical personnel were more highly represented in the resident labor force than in the defense industry labor force. They accounted for 15.7% of all defense industry workers but for 22.2% of the resident labor force.

These findings are presented in Table 7.1. Data are shown for 31,228 workers within the five defense firms surveyed and for 766,040 workers within the general resident labor force.

**Age.** The age composition of persons employed within Long Island's defense sector is of particular significance in developing plans to mitigate the potential impact of defense cutbacks. For example, policy recommendations for those nearing retirement, age 55 or older, would be considerably different from recommendations designed to address layoffs among those who are under 30 years of age and who are just starting their careers.

The defense industry labor force within the five firms surveyed was generally older than Long Island's resident labor force as a whole. It should be remembered, however, that the defense labor force data pertain to 1987 and that the age of the resident labor force was derived from the 1980 census. Nevertheless, it is significant that

35% of all managers in the defense firms surveyed were over age 55 as were 25% of the engineers, 23% of the electrical technicians, 31% of the drafters, almost 26% of the skilled craftpersons and almost 23% of the assemblers. If Long Island's defense industry contracts in the immediate future, many of these workers may have the option of taking early retirement. It has become apparent that Long Island's role in the production of aircraft and aircraft parts is likely to diminish and that fewer assemblers and precision craft workers will be needed. Therefore, the fact that more than one-quarter of the blue-collar workforce in the firms surveyed was over age 55 in 1987 is welcome news. Some of these workers would undoubtedly opt for early retirement in the event of cutbacks.

**Table 7.1**  
**Occupational Characteristics,**  
**The Defense Industry Labor Force (DLF) vs.**  
**The Long Island Resident Labor Force (RLF)**

Occupation	Number		Percent Distribution	
	DLF	RLF	DLF	RLF
Managers	1,975	79,360	6.3	10.4
Professionals	11,669	121,320	37.4	15.9
Engineers	10,597	11,960	33.9	1.6
Computer & Math Professionals	956	2,640	3.1	0.4
Other Professionals	116	106,720	0.4	13.9
Technicians	3,937	14,000	12.6	1.8
Electrical	1,159	2,760	3.7	0.4
Engineering	1,436	1,960	4.6	0.3
Drafters	435	2,360	1.4	0.3
Computer Programmers	734	2,480	2.4	0.3
Other	173	4,440	0.5	0.5
Salespersons	9	91,720	**	12.0
Clerical Workers	4,895	170,320	15.7	22.2
Service Workers	1,056	100,560	3.4	13.1
Skilled Craftpersons	3,044	83,520	9.7	10.9
Assemblers	4,382	45,800	14.0	6.0
Other*	261	59,440	0.9	6.6
<b>Total</b>	<b>31,228</b>	<b>766,040</b>	<b>100.0</b>	<b>100.0</b>

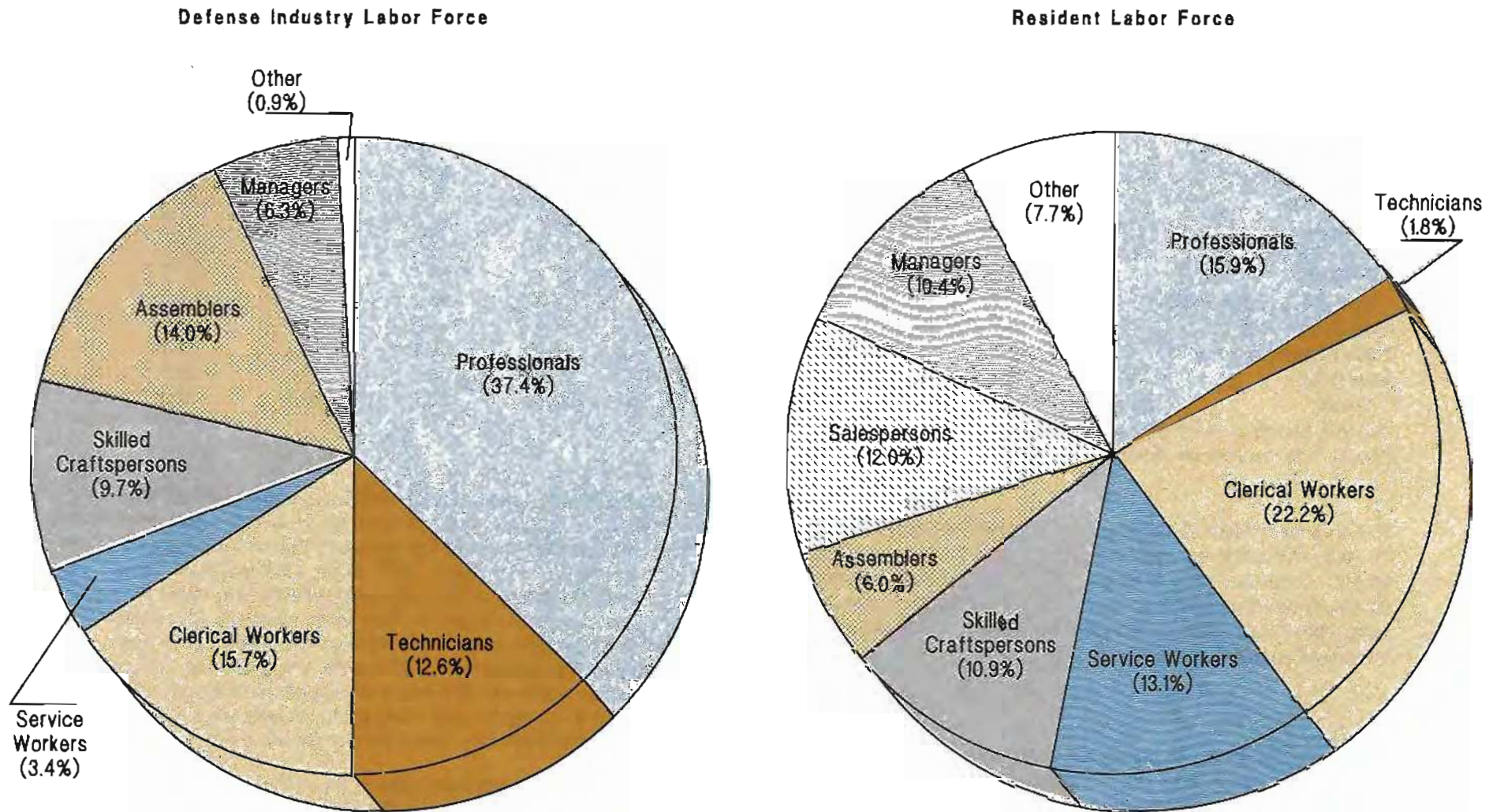
\*Includes farm and transportation occupations

\*\*Less than 0.05%

Source: 1980 census, five defense firms.



**Figure 7.1**  
**OCCUPATIONAL CHARACTERISTICS**  
**DEFENSE INDUSTRY LABOR FORCE vs. RESIDENT LABOR FORCE\***  
**(Percents)**



Source: Personnel data from Grumman, Unisys, Harris, Hazeltine and Eaton/AIL; 1980 Census.

\*Note: The occupational composition of the Long Island resident labor force was derived from the 1980 census; the occupational composition of the defense industry labor force reflects 1987 personnel data from Long Island's large defense firms.



**Table 7.2**  
**The Age Distribution of Workers in Selected Occupations,**  
**The Defense Industry Labor Force (DLF) vs. The Long Island Resident Labor Force (RLF)**

Occupation	Number		% Near Retirement (Over 55)		% Mid-Career (30-54)		% Under 30	
	DLF	RLF	DLF	RLF	DLF	RLF	DLF	RLF
Managers	1,975	79,360	35.2	21.2	58.4	61.9	6.3	16.9
Engineers	10,597	11,960	24.9	19.7	47.9	66.9	27.2	13.4
Computer & Math Professionals	956	2,640	17.4	18.2	55.9	59.1	26.7	22.7
Technicians	3,937	14,000	19.1	11.7	52.1	48.0	28.8	40.3
Electrical	1,159	2,760	23.4	13.0	58.8	47.8	17.8	39.1
Engineering	1,436	1,960	17.0	10.2	44.4	51.0	38.6	38.8
Drafters	435	2,360	31.3	15.3	47.1	44.1	21.6	40.7
Computer Programmers	734	2,480	8.4	3.2	57.9	45.2	33.7	51.6
Clerical Workers	4,895	170,320	20.3	15.9	48.4	49.7	31.4	34.4
Skilled Craftspersons	3,044	83,520	25.8	21.6	51.7	50.6	22.5	27.8
Assemblers	4,382	45,800	22.9	19.1	52.5	44.2	24.6	36.7
<b>Total*</b>	<b>31,228</b>	<b>766,040</b>	<b>23.4</b>	<b>16.6</b>	<b>50.5</b>	<b>50.5</b>	<b>26.1</b>	<b>32.9</b>

\*Includes service workers, farm and transportation occupations

Source: 1980 census, five defense firms.

The findings reveal a preponderance of young workers, under age 30, in the following occupational groups: engineering technicians, 38.6%, computer programmers, 33.7% and clerical workers, 31.4%. Given the current occupational demand pattern within the Long Island labor market, some of these workers would experience a relatively painless transition to non-defense work.

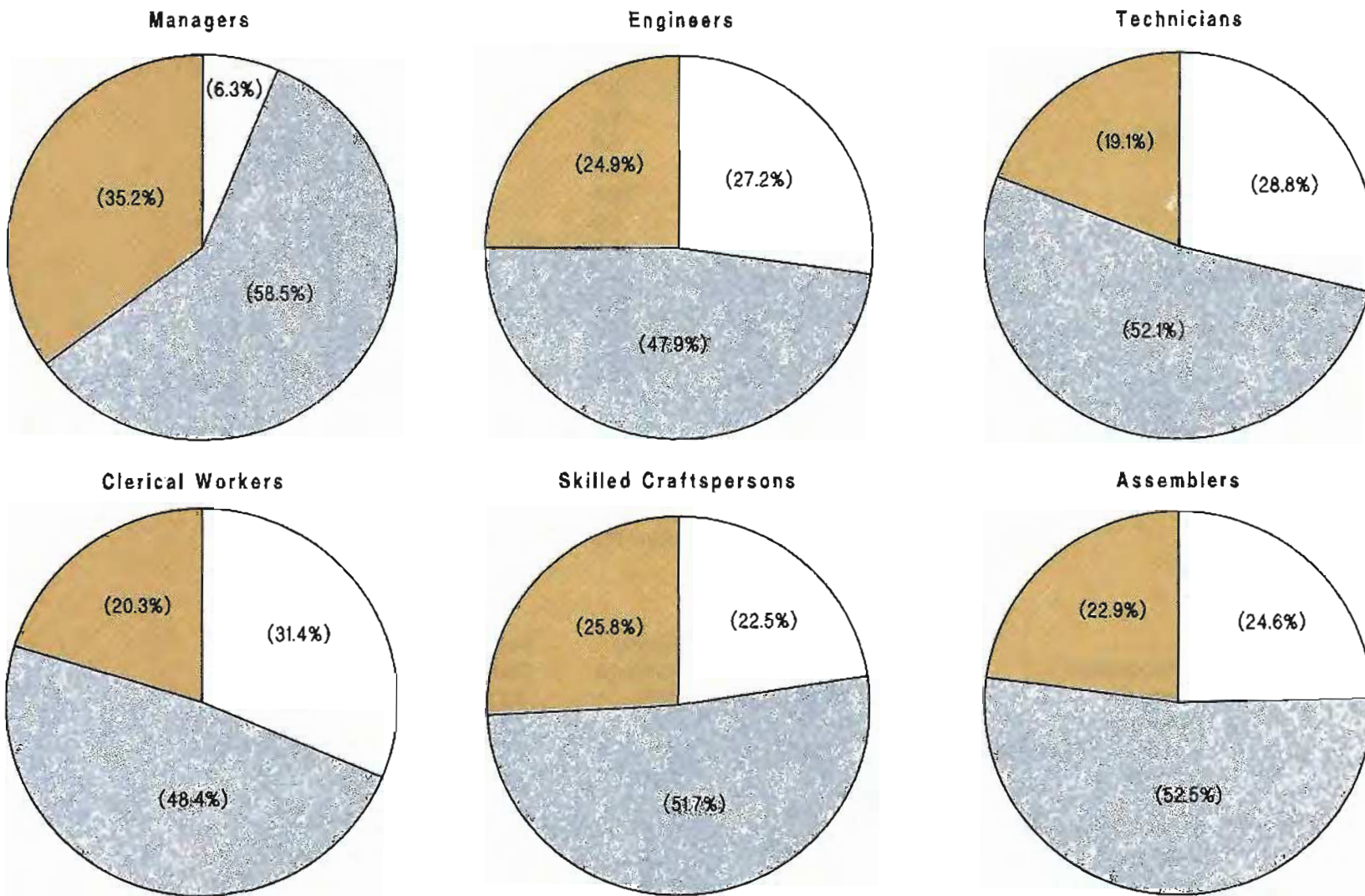
**Years of Service.** An analysis of years of service by occupation for the five defense firms studied indicates that most experienced workers tend to be in the managerial, professional and skilled occupations. By contrast, clerical, maintenance and unskilled production workers tend to be among the least experienced employees. More than 30% of the managers were characterized by at least 25 years of service with their respective firms. By contrast, 40% of the assemblers, 46% of the clerical workers and 55% of the computer programmers had less than five years of service with their firms. This is consistent with the age findings shown in Table 7.2.

**Educational Attainment.** Data on educational attainment were available for a sample of 9,368 workers in the defense firms studied. As expected, the findings indicated that a high proportion of the managers, engineers and other professionals were characterized by college and/or post-graduate training. More than 24% of the managers for whom data were available had some college training and an additional 44% were characterized by post-graduate training. Approximately 52% of the engineers had college training and an additional 30% had a post-graduate education. Almost 27% of all computer and math professionals were college-trained and more than 49% had a post-graduate education.

Relatively few clerical and blue-collar workers in the defense firms surveyed had any college training. Approximately 93% of the clerical workers and 98% of the skilled craft workers and assemblers had no college training. By contrast, only 32% of the managers, 18% of the engineers and 24% of the computer and math professionals were reported as having no college-level training. Within engineering, those without college training tended to be industrial engineers. Almost 44% of the industrial engineers in the survey were reported to have no college training.

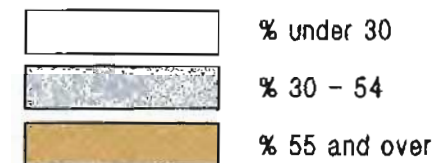


**Figure 7.2**  
**THE AGE DISTRIBUTION OF LONG ISLAND DEFENSE WORKERS**  
**in SELECTED OCCUPATIONS, 1987**  
**(Percents)**



Source: Grumman, Unisys, Harris, Hazeltine, Eaton/AIL

Note: Percentages may not add to 100% due to rounding of figures.





**Table 7.3**  
**Years of Service for Workers in Selected Occupations**  
**The Defense Industry Labor Force**  
**(Percents)**

<b>Occupation</b>	<b>Number</b>	<b>Years of Service</b>					
		<b>0-4</b>	<b>5-10</b>	<b>11-15</b>	<b>16-20</b>	<b>21-25</b>	<b>25 +</b>
Managers	1,975	23.4	15.5	9.7	11.4	9.8	30.1
Engineers	10,597	37.4	17.2	6.0	7.7	17.6	14.1
Computer & Math Professionals	956	35.6	20.9	8.8	9.4	15.7	9.6
Technicians	3,937	40.5	17.9	9.9	5.2	16.4	10.1
Electrical	1,159	23.7	13.0	12.5	5.3	31.2	14.2
Engineering	1,436	50.7	17.7	7.6	5.2	10.1	8.8
Drafters	435	32.0	12.0	14.5	5.7	18.2	17.7
Computer Programmers	734	55.2	27.7	6.0	4.9	4.4	1.9
Clerical Workers	4,895	46.1	21.8	10.5	5.2	8.5	7.9
Skilled Craftspersons	3,044	32.1	18.7	15.2	3.8	15.3	14.9
Assemblers	4,382	40.1	16.6	15.4	5.2	12.5	10.3
<b>Total*</b>	<b>31,228</b>	<b>36.0</b>	<b>19.2</b>	<b>10.4</b>	<b>6.7</b>	<b>14.8</b>	<b>13.0</b>

\*Includes service workers, farm and transportation occupations.

Source: Five defense firms

**Table 7.4**  
**Educational Attainment of Workers in Selected Occupations**  
**The Defense Industry Labor Force**  
**(Percents)**

<b>Occupation</b>	<b>Number</b>	<b>Percent No College</b>	<b>Percent College</b>	<b>Percent Post-Graduate Training</b>
Managers	1,646	32.5	24.2	43.9
Engineers	3,038	18.4	52.1	29.5
Computer & Math Professionals	172	23.8	26.7	49.4
Technicians	1,067	55.4	43.3	1.3
Clerical Workers	2,132	92.8	6.6	0.6
Skilled Craftspersons	484	98.1	1.7	0.2
Assemblers	743	98.5	1.5	0.0
All Other*	86	100.0	0.0	0.0
<b>Total-Defense Labor Force</b>	<b>9,368</b>	<b>54.9</b>	<b>27.5</b>	<b>17.6</b>
<b>Total-Resident Labor Force</b>	<b>766,040</b>	<b>75.8</b>	<b>12.6</b>	<b>11.6</b>

\*Includes service workers

Source: Five defense firms; 1980 census.



In general, workers at the five defense firms studied were more highly educated than the Long Island resident labor force as a whole. Approximately 55% of the defense industry labor force had no college training as compared with 76% for the resident labor force as a whole; 27.5% of the defense industry labor force was college-trained as compared with only 12.6% for the total resident labor force; 17.6% of the defense industry labor force had post-graduate training as compared with 11.6% of the resident labor force.

## EMPLOYMENT and OCCUPATIONAL PROJECTIONS

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In order to determine the possible impact of any future shrinkage in Long Island's defense industry base, it is necessary to examine the future employment climate for the entire manufacturing sector.

This section projects manufacturing employment by industry and occupation through the year 2000 for Long Island, New York State and the United States. State and national projections have been included because Long Island is not a closed economy. Displaced defense industry workers can be expected to find jobs elsewhere in the metropolitan New York region, in New York State and nationally. Industry and occupational projections for the service sector were not included in the analysis because it was assumed that most displaced defense industry workers would prefer jobs in one of the higher-paying manufacturing industries than in the service sector, where a preponderance of jobs are low-paying or temporary. It was further assumed that the current occupational profile of Long Island's defense industry workforce was not consonant with the occupational needs of service sector employers.

The following analysis is based on three data sets:

1. The New York State Department of Commerce Industrial Migration File, 1961 through 1986, which records annual expansion, contraction, opening and closing of industrial plants in New York State;
2. The New York State Department of Commerce Master Business Records file for 1983 which records overall employment in every industrial plant in New York State for that year; and,
3. The U.S. Census Occupational Distribution for Industrial Sectors, 1980 with projections to the year 2000 (also called the *occupation-by-industry matrix*).

**Findings: Employment Projections.** It is anticipated that Long Island will gain almost 4,000 manufacturing jobs between 1988 and the year 2000. This is equivalent to a gain of less than 2%. This represents a downward revision of prior Long Island Regional Planning Board forecasts of manufacturing employment. The revision reflects the anticipated weakness in the defense sector through the year 2000. The largest employment gains are expected to occur in fabricated metals, +1,606, chemicals, +1,458, and paper products, +1,096. However, significant employment declines are projected for both electronic equipment, -1,257 jobs, and transportation equipment (aircraft and parts), -1,207 jobs. Nevertheless, Long Island is expected to fare much better than the state as a whole in terms of manufacturing jobs. New York State is expected to lose almost 151,000 manufacturing jobs between 1988 and the year 2000, a decline of almost 11%. All of the state's manufacturing industries are expected to contract during this period. The largest numerical declines are projected for electronic equipment, -21,824 jobs, apparel, -18,398 jobs, food and kindred products, -12,157 jobs, and printing and publishing, -10,804 jobs.



**Table 7.5**  
**Projected Changes in Manufacturing Employment by Industry, 1983–2000**  
**Long Island, New York State**

SIC Code	Industry	- Long Island -				- New York State -			
		1983 Actual	1988 Estimate	2000 Estimate	Net Change 1988–2000	1983 Actual	1988 Estimate	2000 Estimate	Net Change 1988–2000
20	Food & Kindred Prod.	5,485	5,677	6,139	+462	96,578	91,512	79,355	–12,157
22	Textiles	2,604	2,794	3,248	+454	36,545	33,079	24,760	–8,319
23	Apparel	6,597	6,589	6,570	–19	110,514	102,848	84,450	–18,398
24	Lumber & Wood Prod.	1,548	1,583	1,669	+86	14,637	14,310	13,525	–785
25	Furniture & Fixtures	2,879	2,925	3,037	+112	25,781	24,113	20,111	–4,002
26	Paper Products	5,607	6,064	7,160	+1,096	46,662	44,100	37,951	–6,149
27	Printing & Publishing	11,624	11,887	12,519	+632	120,619	116,117	105,313	–10,804
28	Chemicals	10,348	10,956	12,414	+1,458	72,906	69,560	61,529	–8,031
29	Petroleum & Coal Prod.	355	356	360	+4	6,389	5,179	2,277	–2,902
30	Rubber & Plastics	5,674	5,557	5,275	–282	32,992	30,991	26,187	–4,804
31	Leather Products	1,780	1,812	1,889	+77	31,666	29,363	23,835	–5,528
32	Stone Clay & Glass	1,887	1,966	2,154	+188	47,729	46,463	43,424	–3,039
33	Primary Metals	2,248	2,217	2,143	–74	44,914	40,969	31,500	–9,469
34	Fabricated Metals	14,810	15,479	17,085	+1,606	87,294	84,958	79,350	–5,608
35	Non-Electrical Machinery	30,471	30,411	30,267	–144	198,569	196,134	190,291	–5,843
36	Electronic Equipment	65,888	65,364	64,107	–1,257	217,264	208,170	186,346	–21,824
37	Transportation Equipment	11,561	11,058	9,851	–1,207	58,724	56,562	51,373	–5,189
38	Instruments	16,345	16,486	16,823	+337	176,292	172,620	163,806	–8,814
39	Miscellaneous	5,824	5,940	6,219	+279	67,193	63,311	53,994	–9,317
	<b>Total</b>	<b>203,535</b>	<b>205,121</b>	<b>208,929</b>	<b>+3,808</b>	<b>1,493,268</b>	<b>1,430,359</b>	<b>1,279,377</b>	<b>–150,982</b>

Source: Professors Frank P. Romo and Michael Schwartz, SUNY, Stony Brook



**Findings: Future Occupational Demand.** In order to determine which occupations are likely to be in demand through the year 2000 the national occupation-by-matrix was applied to the employment forecasts shown in Table 7.5. Occupational demand was calculated for each two-digit manufacturing industry. The results were then aggregated to derive an overall occupational demand profile for manufacturing. These calculations were made for Long Island, New York State and the nation. The findings indicate that during the period between 1988 and the year 2000, approximately 1,600 additional managers and almost 3,500 additional engineers will be needed. Long Island will also require an additional 1,000 electrical technicians, 500 engineering technicians and 400 computer programmers. By contrast, the demand for clerical workers will decline by almost 2,000 persons and the number of factory assemblers needed will decline by almost 4,000.

On a statewide basis, 32,700 fewer clerical workers and 30,500 fewer assemblers will be needed. The number of skilled craftspersons needed will decline by almost 12,000. Fewer drafters will also be needed. However, more than 12,000 additional engineers will be required by New York State's manufacturing industries; about half of them will be electrical engineers. New York State's manufacturing sector will also require 5,000 additional electrical and engineering technicians, 1,500 additional computer programmers and approximately 1,400 additional computer and math professionals through the year 2000.

Nationally, fewer clerical and blue-collar workers will be needed within the manufacturing sector. Between 1988 and the year 2000, the number of clerical workers employed in the nation's manufacturing establishments is expected to decline by some 230,000; the number of assemblers is expected to decline by more than 200,000. Conversely, the demand for managers, engineers and technicians is expected to remain strong. Almost 71,000 managers will be needed in manufacturing enterprises nationally. Approximately 165,000 additional engineers will be needed within the nation's manufacturing sector, most of them electrical engineers. Almost 22,000 additional engineering technicians will also be needed.

## The EMPLOYMENT OUTLOOK for LONG ISLAND DEFENSE WORKERS

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The material presented in Table 7.6 provides some indication of the future employment opportunities of workers in the five firms surveyed. This section analyzes those opportunities in greater detail. For purposes of analysis, it has been assumed that those workers over age 55 in the defense firms surveyed would retire by the year 2000 and that only 70% of them would be replaced because of the expected contraction of the defense industry on Long Island. Vacancies created by these retirements have been combined with the projected growth or decline of given occupations within Long Island's manufacturing sector, as shown in Table 7.6, to produce the pattern of job vacancies shown in Table 7.7. These figures do not represent all potential Long Island job openings in the occupations shown as of the year 2000. Rather, they represent potential job openings in those areas to which the skills of defense workers are most readily transferable. That is, they represent potential openings in the five firms themselves as well as openings resulting from the expansion of Long Island's manufacturing sector. Moreover, the analysis does not include possible job openings in New York City to which Long Island residents could commute.

In the normal course of events, some worker turnover would also result from those seeking to better their employment situation. In developing the profile of vacancies by occupation, it was assumed that vacancies occurring as a result of normal worker turnover would be filled in a timely manner from the available labor pool and that no net vacancies would result from this source.

Table 7.7 also addresses the question of how many workers in the firms surveyed could be displaced by the contraction of Long Island's defense industry through the year 2000. The worst case scenario was assumed to be a 30% across-the-board decline in current employment. The best case scenario was assumed to be a 10% decline. These cutbacks, coupled with the expected growth of



**Table 7.6**  
**Net Change in Occupational Demand Within Manufacturing, 1988-2000**  
**Long Island, New York State, United States**

Occupation	- Net Change, 1988-2000 -		
	Long Island	New York State	United States
Managers	+1,585	-805	+70,989
Engineers	+3,445	+12,175	+165,498
Electrical	+1,891	+6,548	+84,003
Industrial	+436	+1,661	+24,805
Mechanical	+573	+2,256	+32,388
Computer & Math Professionals	+347	+1,340	+20,828
Technicians:			
Electrical	+1,025	+3,665	+46,743
Engineering	+446	+1,484	+21,821
Drafters	-297	-2,387	-22,958
Computer Programmers	+390	+1,440	+24,079
Clerical	-1,975	-32,749	-230,163
Skilled Craftspersons	+451	-11,410	-29,589
Assemblers	-3,697	-30,492	-202,281

Source: Professors Frank P. Romo and Michael Schwartz, SUNY, Stony Brook.

the resident labor force within each occupation, gives a rough approximation of the pool of workers likely to be competing for the vacant positions. The labor pool does not include reverse commuters from New York City and elsewhere who might possibly seek employment on Long Island.

The material presented in Table 7.7 represents a hypothetical scenario based on a number of assumptions. These assumptions may not materialize in the precise form stated. Nevertheless, the exercise is useful in pinpointing those problem occupations in which the supply of workers is likely to exceed the supply of jobs by a considerable margin. These problem areas must ultimately be addressed by well-targeted retraining programs and, in some cases, by the relocation of redundant defense industry workers.

**Managers.** Potential vacancies created by retirements in the five firms surveyed coupled with the growth of demand for managers within Long Island's manufacturing sector are expected to create almost 2,100 managerial job openings through the year 2000. Possible layoffs of managers within the defense firms studied coupled with the projected increase in managers within Long Island's resident labor force could create a pool of 7,000

managerial job seekers. However, in reality, much of the increase in managers within the resident labor force will reflect the influx of managers employed in New York City. Therefore, no major supply-demand imbalances are expected.

**Engineers.** As Table 7.7 indicates, the demand for engineers on Long Island is expected to be sufficiently strong through the year 2000 to absorb both a 10% increase in engineers within the resident labor force and a 30% reduction in the current engineering workforce within the five firms studied. However, there may be some imbalances in terms of specific engineering specialties.

**Computer and Math Professionals.** Job opportunities for computer and math professionals currently employed in the five firms surveyed would also appear to be relatively good. Retirements coupled with the growth of demand within manufacturing for persons with these skills should generate about 500 jobs. Only about 420 jobseekers would result from a 30% contraction in the staff of computer and math professionals at the five firms surveyed coupled with a 5% increase in the number of computer and math professionals residing on Long Island.



**Table 7.7**  
**The Employment Prospects of Workers in the Five-Firm Sample in the Year 2000,**  
**By Occupation**

**- Derivation of Job Vacancies -**

<b>Occupation</b>	<b>Anticipated Retirements In Five-Firm Sample</b>	<b>Change in Demand Within Manufacturing</b>	<b>Total</b>
Managers	486	1,585	2,071
Engineers	1,847	3,445	5,292
Computer & Math Professionals	116	347	463
Technicians:			
Electrical	190	1,025	1,215
Engineering	171	446	617
Drafters	95	-297	-202
Computer Programmers	43	390	433
Clerical Workers	696	-1,975	-1,279
Skilled Craftspersons	550	451	1,001
Assemblers	702	-3,697	-2,995

**- Derivation of Available Labor Pool -**

Occupation	-Increase in Resident- Labor Force				-Total Labor Pool-	
	10% Contraction	30% Contraction	Number	Percent	10% Contraction	30% Contraction
Managers	197	592	3,174	4%	3,371	6,940
Engineers	1,060	3,179	1,196	10	2,256	4,375
Computer & Math Professionals	96	287	132	5	228	419
Technicians:						
Electrical	116	348	138	5	254	486
Engineering	144	431	98	5	242	529
Drafters	43	131	118	5	161	249
Computer Programmers	73	220	174	7	247	394
Clerical Workers	490	1,468	6,812	4	7,302	8,280
Skilled Craftspersons	304	913	2,506	3	2,810	3,419
Assemblers	438	1,315	458	1	896	1,773

Source: LIRPB



**Technicians.** The demand for electrical technicians is expected to outstrip their supply on Long Island by a wide margin in the year 2000: 1,200 versus 500. However, supply-demand relationships for engineering technicians and computer programmers are expected to remain in relatively good balance. By contrast, the number of drafters seeking jobs are expected to exceed the number of drafting jobs. Within manufacturing, jobs for drafters are expected to decline in absolute terms both on Long Island and nationally.

**Clerical Workers.** There is likely to be a major imbalance between the supply of and the demand for clerical workers on Long Island and this imbalance will be exacerbated by the potential displacement of clerical workers in the five firms studied. Assuming only 4% growth in clerical workers within the resident labor force and a 30% contraction in the clerical workforce in the five firms studied, almost 8,300 clerical workers could be seeking jobs in the year 2000. The number of clerical workers needed by Long Island's manufacturing sector is expected to decline through the year 2000. In addition, the expansion of clerical jobs in non-manufacturing industries will be constrained by the spread of office automation. Nor do clerical salaries justify relatively long worktrips. Some excess clerical workers could possibly be retrained for those occupations likely to be in short supply within the defense sector. The technical specialties are a case in point.

**Skilled Craftspersons.** There is also likely to be an excess supply of skilled blue-collar workers on Long Island in the year 2000. Assuming a 3% increase in skilled craftspersons within the resident labor force and a 30% contraction in the number of craftspersons within the five firms studied, some 3,400 craftspersons could be competing for about 1,000 craft jobs within Long Island's manufacturing sector.

**Assemblers.** Factory assemblers will also face unfavorable prospects. Jobs for such workers are expected to contract substantially on Long Island through the year 2000. This is also true for New York State and the nation. Many assemblers are characterized by limited educational attainment and may require remedial education in order to retrain successfully for other occupations.

## CONCLUSIONS:

### Future Employment Prospects for Long Island Defense Workers

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The data shown in Table 7.7 assume that Long Island is a closed labor market in that those living off Long Island don't compete for Long Island jobs and that those living on Long Island don't commute to New York City. In reality, there is still substantial cross-commutation. The findings also ignore jobs that are likely to be created outside the manufacturing sector. Despite these limitations, the findings suggest that the Long Island economy can readily absorb even a 30% contraction of the current workforce within its major defense firms over the next decade. One explanation is that a significant segment, almost one-quarter, of the workforce at these firms is approaching retirement. In addition, Long Island's manufacturing sector is expected to continue to grow, albeit slowly, and this will generate jobs for some displaced defense industry workers.

However, blue-collar workers, including skilled craftspersons in the metal trades, will face an increasingly difficult employment situation on Long Island if airframe production contracts, as expected. Approximately one-quarter of the skilled craftspersons in the firms surveyed will probably retire between now and the year 2000. Others will be able to relocate to areas that are more highly dependent on manufacturing and that may require their unique skills. However, many displaced craftspersons and most displaced factory assemblers could face prolonged periods of unemployment. Displaced clerical workers may also experience difficulty in finding jobs. The rapid growth in demand for clerical workers which Long Island experienced during the past two decades will slow as the growth of the Long Island economy slows and as office automation takes hold. These macroeconomic forces will have a more profound influence on future employment opportunities for clerical workers than the anticipated contraction of Long Island's defense sector.

The findings also suggest that Long Island's major defense firms are a repository of skilled engineering and technical talent. The availability of such skilled workers provides a major competitive advantage in Long Island's quest to attract additional high-technology enterprises in non-defense areas.



## CHAPTER 8...

# THE SCOPE AND EFFECTIVENESS OF LOCAL ECONOMIC DEVELOPMENT EFFORTS

Government agencies at several levels of government seek to promote Long Island as an attractive location for business. In addition, a number of private *action groups* and chambers of commerce promote local economic development and seek to improve the Long Island business climate. This chapter analyzes the role and functions of each of these agencies and organizations and evaluates the effectiveness of economic development efforts on Long Island. The underlying premise is that any dislocations within the defense sector can be minimized by strong, on-going economic development programs.

The persons listed on the following page were interviewed in developing material for this chapter.

### GOVERNMENT and QUASI-GOVERNMENTAL AGENCIES

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**U.S. Small Business Administration.** The SBA operates a field office in Melville. It guarantees loans for firms that lack the financial stability or track record to borrow on their own at reasonable rates of interest. Other SBA loans include small general contractor loans, energy loans, handicapped assistance loans, disaster assistance and pollution control financing. The SBA also sponsors meetings and seminars and is actively involved in the Procurement Technical Assistance Program to obtain Department of Defense contracts for local firms. The Agency functions as an advocate for small business. It analyzes the impact of Federal laws, regulations and tax provisions on small businesses, lobbies for legislation to assist the small business community and encourages small business exports. Approximately 90% of all Long Island firms qualify as small businesses.



Name	Agency, Organization	Address
Richard J. Bornstein <i>President</i>	Huntington Township Chamber of Commerce	Carver and Green Streets Huntington, N.Y.
Roy Cacciatore <i>Former Commissioner</i>	Nassau County Department of Commerce and Industry	1550 Franklin Avenue Mineola, N.Y.
Martin R. Cantor <i>Commissioner</i>	Suffolk County Department of Economic Development	Veterans Memorial Highway Hauppauge, N.Y.
George Fey <i>President</i>	Long Island Tourism and Convention Commission	Eisenhower Park East Meadow, N.Y.
George Gatta <i>Director</i> <i>Director</i> <i>Director</i>	Islip Town Economic Development Industrial Development Agency Industrial Commission	655 Main Street Islip, N.Y.
Roslyn Goldmacher <i>Executive Director</i>	Long Island Development Corp.	265 Glen Cove Rd. Carle Place, N.Y.
William Heins <i>Commissioner</i> <i>Vice Chairman</i>	Hempstead Town Dept. of Commerce and Industry Industrial Development Agency	350 Front St. Hempstead, N.Y.
Stephen Latham <i>Executive Director</i>	Nassau County Industrial Development Agency	1950 Franklin Avenue Mineola, N.Y.
Walter Leavitt <i>Branch Manager</i>	United States Small Business Administration	35 Pinelawn Road Melville, N.Y.
Seth Lee <i>Special Assistant</i>	Suffolk County Dept. of Economic Development	Veterans Memorial Hwy. Hauppauge, N.Y.
Larry Nedelka <i>Director</i>	L.I. Area Development Agency	1425 Old Country Rd. Plainview, N.Y.
Paul Nelson <i>Executive Secretary</i>	Brookhaven Town Economic Development Commission	3233 Route 112 Medford, N.Y.
Mitchell Pally <i>Director of Legislative &amp; Economic Affairs</i>	Long Island Association of Commerce and Industry	80 Hauppauge Road Commack, N.Y.
Paul Townsend <i>Editor</i>	Long Island Business	2150 Smithtown Ave. Ronkonkoma, N.Y.



**New York State Department of Economic Development.** This Agency attempts to create and retain permanent jobs in New York State. The DED identifies the state permits and licenses required for given projects and facilitates the process of obtaining such permits and licenses; it participates in the Procurement Technical Assistance Program; it assists firms with site and building selection; it publishes pamphlets and maps to promote New York State tourism and provides matching funds to county and regional tourism organizations. The Agency also encourages exports by providing business firms with information about export opportunities, by staffing booths and providing translators at foreign trade missions and by participating in export seminars.

On April 27-28, 1988, the Department's Division for Small Business ran a highly-effective *Matching Conference* for former Fairchild-Republic subcontractors. The Conference brought together subcontractors and representatives from prime contractors and government agencies throughout the country in an effort to expand the business contacts of Long Island subcontractors and to enable them to deal directly with distant primes and with government agencies. As part of this process, the Division prepared a booklet listing the names, addresses, telephone numbers, contact persons and product or service of each subcontractor.

**Other New York State Economic Development Programs.** New York State has eleven financial assistance programs, most of which are administered by the New York State Job Development Authority or the New York State Urban Development Corporation. Most provide low interest loans for construction, acquisition and/or rehabilitation of plant and equipment, for acquisition of machinery or for working capital. Some of the programs are geared toward assisting economically-distressed areas and minority and women-owned businesses. The state also offers investment tax credits and various incentives for businesses located in Economic Development Zones. The latter include real property tax exemptions and sales tax credits on building materials. In 1988, the New York Business Development Corporation was established. The Corporation, formed by a consortium of New York State banks, was authorized by the State Legislature. The Corporation makes loans to small businesses in the state for any purpose using money from its member banks and funds from the New York State Retirement System. Loans are made both on a conventional basis and under the SBA guaranteed loan program.

**Long Island Development Corporation.** The LIDC is a not-for-profit membership corporation certified by the U.S. Small Business Administration as a development company under its 503/504 programs. The LIDC makes loans to small businesses for capital expansion and can participate with banks, private lenders, IDA, JDA, UDAG and other government programs to provide a complete financing package. In addition to its SBA function, the LIDC is certified by the New York State Job Development Authority as its branch bank for Long Island. Thus, it can approve the JDA portion, in joint SBA/JDA projects, for JDA.

The Long Island Development Corporation was formed in 1980 for the sole purpose of assisting small business concerns in Nassau and Suffolk Counties under the SBA 503 program. Under the SBA 503/504 programs, a qualified small business concern may receive money for purposes of expansion. The funds may be used only for the acquisition and/or renovation of capital assets and the small business must demonstrate that it will be expanding and creating jobs in the community. The Long Island Development Corporation (SBA) share of the financing may go up to 47% of the project cost with a dollar cap of \$500,000. Borrowers must create at least one new job for every \$15,000 of SBA funds used. At least 10% of the project cost must come from the community or the borrower company or its principals. Fifty percent of the project cost must come from non-federal sources. The LIDC raises its funds by issuing a debenture that is fully guaranteed by the SBA. The program provides long-term subordinate mortgage money for growing small businesses that cannot obtain such funds on reasonable terms from the private sector. Typically, the project financing comes from a bank for 50% in its first mortgage position, LIDC (SBA) for 40% in second mortgage position, and the 10% injection in third position.

Another typical financing scenario involves the New York State Job Development Authority, which can lend up to 40% of the project cost. The LIDC will provide an additional 40% and the company or principals will provide the final 20% of the project cost. The LIDC (SBA) can also combine with funds from purchase money mortgage, private lenders and industrial revenue bonds.

In 1988, the LIDC became the marketing agent on Long Island for the newly-formed New York State Business Development Corporation.

During 1987, the LIDC approved 49 loans for SBA 504 assistance involving a total of \$14,090,000 of SBA funds. The LIDC also approved nine JDA branch bank loans totaling \$4,460,200.



**Long Island Area Development Agency.** The Long Island Area Development Agency, Inc. (LIADA) was created in 1978. Its objectives are: to promote and encourage business and industrial development within the Long Island region; to encourage new business and industry to locate on Long Island; and, to act as the principal coordinator of various economic development activities planned and/or undertaken within the region. LIADA was created as an outgrowth of the two separate County Overall Economic Development Program Committees in Nassau and Suffolk Counties. The Agency includes representation from all major economic development organizations on Long Island to encourage them to function in a cooperative rather than a competitive way. The Agency was instrumental in getting Long Island's federal designation as an Economic Development District.

LIADA administers the Trade Adjustment Assistance Program for Long Island as well as for New York City and Westchester County, New York. The program is funded by the International Trade Administration of the U.S. Department of Commerce. If Washington determines that a local manufacturer has been hurt by imported products and certifies that firm as eligible for technical assistance, the Federal government will pay 75% of the cost of that assistance. The firm itself must pay the remaining 25%. LIADA renders such assistance in the form of counseling in the areas of marketing and management techniques, finance and manufacturing strategies. Firms are sometimes helped to retool for other product lines.

LIADA also oversees the Long Island Regional Export Development Council. The Council was created approximately three years ago to promote international trade by Long Island firms. It helps firms to identify foreign markets for their products. It also counsels them on the legal ramifications of exporting their products and advises them concerning the steps needed to obtain an export license. The Export Development Council also brings commercial counselors from foreign consulates to meet with Long Island business firms. Thus far, counselors from Canada, Barbados, Pakistan, Malaysia, the Bahamas, Trinidad, Tobago and France have been involved in such meetings.

**Long Island Tourism and Convention Commission.** The Long Island Tourism and Convention Commission operates two tourist information centers.

One is located on the Long Island Expressway and other on the Southern State Parkway. The Commission is the designated marketing agency for meetings, conventions, trade shows, business and leisure travel within Nassau-Suffolk. It participates with Nassau and Suffolk Counties in international trade missions and represents the region at travel-related trade shows. It is also represented on the Board of Directors of the Long Island Area Development Agency.

**Nassau County Department of Commerce and Industry.** This Agency assists firms that are relocating to Nassau County or that seek to expand within the County. It is a source of information and financial assistance for new businesses.

The Agency also helps to promote the tourist and film industries within Nassau County. Their publication, Commerce and Industry News, apprises the business community of the various assistance programs that are available to them.

A number of other agencies use the offices of the Nassau Department of Commerce and Industry. They include the Nassau County Industrial Development Agency, the Nassau County Film Commission, the Nassau County Convention and Visitors Bureau and the Service Corps of Retired Executives (SCORE). The Nassau County Department of Commerce and Industry works closely with the Suffolk County Department of Economic Development. They co-sponsor publications such as the Long Island Almanac and the Long Island Directory of Manufacturers.

**Suffolk County Department of Economic Development.** The Suffolk County Office of Economic Development was recently upgraded and is now a separate and distinct Department of Economic Development. This move underscores the County Executive's emphasis on economic development issues, his intent to centralize the County's role in economic development and his desire to formulate business, academic and government partnerships, expand foreign trade opportunities and enable the County to be innovative in meeting the needs of a diverse and changing economy.



The Department has formed advisory councils with respect to agriculture, fishing, farming and women and minority-owned businesses. These councils will apprise County government of existing problems in these areas so that the County can assist in formulating solutions. A committee of specialists from academia, business and banking has been established to encourage exports by Suffolk County small businesses. The Department is working with the Long Island Tourism and Convention Commission to promote tourism within the County and has been active in promoting Suffolk County as a place to make films. Department personnel have been meeting with Suffolk's high school guidance counselors and faculty members in an effort to encourage local high school students to attend college on Long Island and thereby end the *brain-drain* which could hobble Long Island high technology industries. The Department is also actively involved in the Long Island Export Mission and the Procurement Technical Assistance Program.

The Department has been working closely with the Long Island congressional delegation to strengthen Long Island's defense industry. It is in the preliminary stages of seeking funding to prepare a feasibility study for construction of a performing arts center in Suffolk County. It has also applied for two grants to establish a minority and women-owned development center and an entrepreneurial enterprise center on Long Island.

Suffolk is the most active county in New York State in procuring JDA loans. It accounts for one-fourth of all JDA loans in the state.

**Town of Hempstead Department of Industry and Commerce.** This Agency helps to attract commerce and industry to the Town. It also assists small businesses to get started and to expand. It advertises through local chambers of commerce and newspapers and holds regular conferences to assist businesses located in the Town. The Town of Hempstead also has an active Industrial Development Agency. A major IDA bond was recently issued for construction of the Hempstead Resource Recovery facility.

**Town of Brookhaven Economic Development Commission.** This Agency assists companies in relocating or expanding within the Town. It advertises, distributes promotional brochures and maintains booths at trade shows. The Agency also participates in the Long Island Export Mission and the Procurement Technical Assistance Program and helps expedite site plan and permit approvals within the Town. The Town of Brookhaven also has an active Industrial Development Agency.

**Town of Islip Department of Economic Development.** This Agency helps businesses expand or relocate within the Town of Islip. The Agency works with local chambers of commerce and prepares papers on topics of concern to the business community. The Department sponsors an *employment day* which brings together local employers and high school seniors. It was instrumental in having a portion of Central Islip designated as an *economic development zone*. Businesses operating in the zone enjoy tax abatements. The Agency also participates in the Procurement Technical Assistance Program.

The Town of Islip owns and operates a Foreign Trade Zone at MacArthur Airport and has an active Industrial Development Agency.

**Other Town and City Agencies.** The Towns of Babylon and Riverhead each have an Industrial Development Agency to promote industrial growth. The City of Glen Cove also has an active Industrial Development Agency. There are inactive IDAs in the Towns of East Hampton and Riverhead and in the Village of Greenport. Although they have not made any IDA loans, the vehicle for doing so is in place.

#### **Private Sector Business Groups: Chambers of Commerce**

**Long Island Association of Commerce and Industry (LIA).** The LIA is the regional chamber of commerce for Long Island. It is fully accredited by the U.S. Chamber of Commerce. The LIA was established approximately sixty years ago to serve the Long Island business community. The Association's overall goal is to pursue public policy initiatives that benefit Long Island business. It currently has some 3,450 members.

The LIA has six standing committees -- transportation, tax, energy, environment, housing and small business -- as well as a World Trade Club. The transportation committee has been working to obtain additional highway funds for Long Island and to improve highway capacity. The tax committee periodically reviews federal and state tax legislation affecting Long Island businesses. An example is the Tax Reform Act of 1986. It also reviews Nassau and Suffolk County budgets on an ongoing basis. The energy committee is concerned with bringing additional low cost power to Long Island. It has been studying the potential of co-generation and is currently reviewing the settlement between New York State and



the Long Island Lighting Company. The environmental committee seeks to assure a viable economy while at the same time protecting environmentally sensitive land. It is particularly concerned with recycling and solid waste issues. The housing committee is attempting to provide more affordable housing on Long Island. It has been a prime mover in the formation of the Long Island Housing Partnership, which has begun to construct affordable housing in Nassau-Suffolk. The small business committee reviews legislation that affects the small business community. The World Trade Club helps to promote Long Island exports. To this end, it works with the Long Island Regional Export Development Council to acquaint Long Island firms with export opportunities.

A major recent initiative by the LIA was the Long Island Project 2000 regional study. The study was conducted by the LIA, Nassau and Suffolk Counties and researchers at Hofstra University and SUNY, Stony Brook. The study outlines objectives and offers action plans for developing a better future for Long Island. Goals, objectives and action priorities were established for ten study areas: economic development, environment, taxation, transportation, energy, housing, human resources, education, culture and Long Island identity.

The economic development goal was to increase economic diversity and stability and to sustain vigorous economic growth and continued prosperity through the year 2000. The environmental goal was to establish a well-coordinated environmental management plan that recognizes the critical connection between environmental protection and economic development. The taxation goal was to redress the imbalance between the perceived high levels of taxation and the perceived inefficiency of public services.

The transportation goal was to reestablish intra-island accessibility as well as the New York City/Long Island link in order to enhance Long Island's business climate, attractiveness and quality of life. The energy goal was to assure a dependable and adequate supply of energy at a reasonable cost. The housing goal was to assure a more balanced supply of housing types and costs in order to address the needs of the full range of Long Island households.

The human resources goal was to build and maintain a stronger human services development infrastructure as a support structure for enhanced economic development.

The education goal was to strengthen and refocus the Island's entire range of educational resources to support changing economic needs and policies. In the area of culture, the goal was more coordinated development and marketing of Long Island's cultural and recreational base. The study group suggested that Long Island pursue educational awareness efforts to increase utilization of and support for cultural resources.

Thus, Project 2000 offers one possible blueprint for future regional economic development.

**Local Chambers of Commerce.** Long Island also has many local chambers of commerce that actively promote economic development in their respective areas. The Huntington Township Chamber of Commerce is Long Island's largest local chamber of commerce. It is fully accredited by the U.S. Chamber of Commerce. The Chamber was established 63 years ago and currently has about 1,100 members. The Huntington Township Chamber of Commerce has four primary objectives: economic development, community improvement, public advocacy and membership services. These objectives are implemented by an eight-member professional staff which executes the policy direction provided by a twenty-five member Board of Directors representing diverse business, professional and civic interests throughout the community. Its goals are implemented through several action committees and task forces.

#### Action Committees

Congressional Action  
Education Committee  
Environmental Control  
Human Resources  
Law Enforcement and Public Safety  
Membership Benefits  
Planning and Zoning  
State Legislation  
Town Finance

#### Task Forces

Building Task Force  
Chamber Foundation  
Dependent Care Task Force  
Eagle Hill School Property Task Force  
Huntington Village Parking  
Long Island Expressway Service Roads  
Long-Range Planning Task Force  
Melville Industrial Sewer District



These committees deal with issues ranging from local matters to national concerns. For example, the Congressional Action Committee studies the key issues before Congress and makes recommendations to congressional representatives and to the national chamber of commerce. The Human Resources Committee works on projects associated with youth, senior citizens, the handicapped and health care. The State Legislation Committee studies the key issues before the State Legislature and communicates the Chamber's recommendations to local representatives and to the Business Council of New York State. Chamber members have the privilege of enrolling in a cost-saving health insurance program sponsored by the Chamber. A Service Corps of Retired Executives (SCORE), which gives complimentary and confidential advice to existing and new business firms, is sponsored by the Chamber. The Chamber also sponsors workshops on business financing, advertising, insurance and tax laws. Thus, the Huntington Chamber is broadly involved in activities that support businesses in the Town and on Long Island. A listing of local chambers of commerce and merchants associations follows:

#### Local Chambers of Commerce Address

Amityville	253 County Line Rd., Amityville 11701
Babylon	PO Box 443, Babylon 11702
Baldwin	1980 Grand Ave., Baldwin 11510
Bayport-Blue Point	PO Box 201, Bayport 11705
Bay Shore	74th Ave., Bay Shore 11706
Bayville	13 Hilltop Dr., Bayville 11709
Bellmore	PO Box 861, Bellmore 11710
Central Brookhaven	PO Box 617, Middle Island 11953
Cutchogue-New Suffolk	c/o Josephine's of Cutchogue Main Rd., Cutchogue 11935
East Hampton	4 Main St., E. Hampton 11937
East Meadow	PO Box 77, E. Meadow 11554
East Setauket (Three Village)	PO Box 6, E. Setauket 11733
Farmingdale Merchants	PO Box 312, Farmingdale 11735
Franklin Square	PO Box 11, Franklin Square 11010
Freeport	PO Box 7304, Freeport 11520
Garden City	953 Franklin Ave., Garden City 11530
Glen Cove	12B Village Sq., Glen Cove 11542
Great Neck	1 Great Neck Rd., Great Neck 11021
Green Acres Mall Merchants Assn.	2034 Green Acres Mall, Valley Stream 11581
Greenport-Southold	PO Box 66, Greenport 11944
Greenvale	PO Box 123, Greenvale 11548

Hampton Bays  
Hempstead  
Hicksville  
Holbrook  
Huntington Tnshp  
Island Park  
Islip  
Kings Park  
Lawrence

Levittown  
Long Beach  
Lynbrook  
Manhasset  
Massapequa  
Mattituck  
Merrick  
Miller Place/Mt. Sinai  
Mineola  
Montauk  
Moriches  
Nassau Council

New Hyde Park  
Northport  
Oyster Bay  
Greater Patchogue  
Plainview/Old Bethpage  
Greater Port Jefferson  
Port Jefferson Station/Terryville  
Port Washington  
Riverhead  
Rockville Centre  
Roslyn  
Sag Harbor  
Sayville  
Seaford  
Shelter Island  
Shirley & The Mastics

Southampton  
Spanish-American

PO Box 64, Hampton Bays 11946  
50 Clinton St., Hempstead 11550  
252 Old Country Rd., Hicksville 11801  
PO Box 565, Holbrook 11741  
151 W. Carver St., Huntington 11743  
PO Box 225, Island Park 11558  
Box 112, Islip 11751  
PO Box 322, Kings Pk 11754  
Village Hall, 311 Central Ave.,  
Lawrence 11559  
PO Box 207, Levittown 11756  
100 W. Park Ave., Long Beach 11561  
40 Stauderman Ave., Lynbrook 11563  
131 Plandome Rd., Manhasset 11030  
504 Hicksville Rd., Massapequa 11758  
PO Box 1056, Mattituck 11952  
PO Box 53, Merrick 11566  
PO Box 512, Miller Pl. 11764  
27 E. Jericho Tpke., Mineola 11501  
The Plaza, Montauk 11954  
PO Box 686, Center Moriches 11934  
c/o NC Dept. of Commerce & Ind.  
1550 Franklin Ave., Mineola 11501  
PO Box 247, New Hyde Park 11040  
PO Box 33, Northport 11768  
PO Box 21, Oyster Bay 11771  
15 N. Ocean Ave., Patchogue 11772  
8 Peter La., Plainview 11803  
118 W. Broadway, Pt. Jefferson 11777  
PO Box 600, Pt. Jefferson Sta. 11776  
PO Box 121, Pt. Washington 11050  
141 E. Main St., Box 291, Riverhead 11901  
PO Box 950, Rockville Ctr. 11571  
PO Box 102, Roslyn 11576  
*The Windmill* PO Box 116, Sag Harbor 11963  
PO Box 235, Sayville 11782  
PO Box 233, Seaford 11783  
PO Box 598, Shelter Island 11964  
Quadra RE, 1467 Montauk Hwy.,  
Mastic 11950  
76 Main St., Southampton 11968  
131 E. Riviera Dr., Lindenhurst 11757



Uniondale	PO Box 203, Uniondale 11553
Valley Stream	265 E. Merrick Rd., Valley Stream 11582
Wantagh	PO Box 660, Wantagh 11793
Westbury	167 Post Ave., Westbury 11590
Greater Westhampton	PO Box 1228, Westhampton Beach 11978
Williston	PO Box 207, Williston Park 11596
Woodmere Merchants Assn.	c/o Rusty's, 1044 Bway., Woodmere 11598

## PRIVATE SECTOR BUSINESS GROUPS: ACTION GROUPS

Long Island also contains a number of *action groups* that promote economic development in the bi-county area.

**110 Action Group.** The 110 Action Group is primarily concerned with road improvements, cooperative day care centers, developing an effective energy plan and developing a sensible solid waste management plan. The organization's sponsors are drawn from banking, law, accounting, the hospitality industry, the aerospace industry, management consulting and realty firms. The group has standing committees on airports, balanced land use, energy, the environment, solid waste management and transportation. It holds weekly breakfast meetings on Route 110 in Melville.

**Long Island Mid-Suffolk Business Action (LIMBA).** This group was established in 1968 and currently has about 120 members. It deals primarily with the concerns of the mid-Suffolk business community. Its priority projects are as follows: to increase flights from MacArthur Airport; to further develop the Ronkonkoma transportation hub; to recycle abandoned or underutilized buildings at the Pilgrim State Psychiatric Hospital for commercial, industrial and residential use and for public health and rehabilitation facilities; to complete Long Island Expressway service roads through Jericho, Plainview, Dix Hills and Commack; to build a new county court center; and to institute ferry service between the mid-Suffolk area and New England.

**Long Island Forum For Technology (LIFT).** This organization was established about twelve years ago and currently has about 150 members. Its membership is drawn from Long Island's high-technology and aerospace firms as well as from educational institutions, laboratories and government agencies. Its goals are as follows: to expand the interchange of technical information through conferences, publications and weekly breakfast programs; to work closely with schools, colleges and laboratories to strengthen Long Island's pool of trained technical workers; and, to develop plans to provide affordable housing for young engineers, scientists and technicians. LIFT recently received a grant from the New York State Urban Development Corporation to develop a computerized data base of Long Island's technical capabilities. It has also been designated by the New York State Science and Technology Foundation as the technology development organization for Long Island.

**Eastern Long Island Execs (ELIE).** This group holds monthly supper meetings to advance the balanced economy of eastern Long Island while preserving and restoring the area's unique environment. Its goals are to provide affordable housing and year-round jobs; to establish ferry service from mid-Suffolk to New Haven; to increase airline service at MacArthur and improve general aviation and commuter service at East End airports; to develop environmentally-compatible industry including agriculture, mariculture, viticulture, equiculture and research and development; to solve garbage and waste disposal problems while protecting the water table and natural environment; and, to increase career and college education opportunities.

**Downtown Long Island Forum.** The Forum is an informal association of executives and professionals in business, educational institutions and government. It was established in 1978 and currently has about 90 members. Its focus is the Mitchell/Roosevelt Field, Hempstead and Garden City areas of Nassau County. Its goals are to help this area to achieve its full, balanced potential as Long Island's central office, retail, entertainment and convention complex and to improve the overcrowded infrastructure of the area. Its specific goals are as follows: to resolve the water and air pollution problems that are restricting the sound development of Mitchell Field; to improve road access to the area; to improve mass transit within the area; to construct a 200,000 square foot Nassau County Civic Center; to revitalize downtown Hempstead; to complete office construction in the area; and, to promote retail activity in Garden City, Roosevelt Field and along Old Country Road.



**Long Island Business Development Council.** The Council is an informal network of development professionals on Long Island. It was established 17 years ago and currently has about forty members including Long Island's leading builders, brokers and bankers. It provides a practical mechanism for exchanging information among those involved with the retention and expansion of existing companies and the growth of new businesses. Participation is by invitation only.

## CONCLUSIONS

### The Scope and Effectiveness of Economic Development Efforts

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Long Island is characterized by a rich network of public and private-sector economic development agencies and groups. The commitment to economic development by several levels of government, by local chambers of commerce and by a plethora of *action* groups leads to the perception that there is a duplication of services in terms of advertising, business loans and other business development activities. In reality, each of these organizations and agencies fills a specific need and the various economic development efforts complement each other. The current configuration of economic development activities on Long Island exemplifies a *network* approach that is much more effective in attracting and retaining business than the *lone wolf* approach.

There is, nevertheless, room for improvement. Better financing mechanisms are needed. IDA financing has been greatly reduced by the Tax Reform Act of 1986 so that alternate financing mechanisms are needed. Another problem is that many towns and school districts have opted out of the 485B tax abatement program. This program gives new businesses a 50% reduction in local property taxes during their first year of existence, with the reduction diminishing by 5% in each subsequent year.

A number of economic development officials have also suggested the need for a more comprehensive economic data base, a more effective marketing strategy, retraining programs that focus on the actual needs of employers, and a greatly expanded supply of affordable housing. They also underscore the need to educate the public concerning how business helps to create tax ratables and thereby hold down property taxes. Economic development officials appear to believe that the constant tug-of-war between business advocates and those who oppose growth has begun to damage the business climate on Long Island. These officials also suggest that the overregulation of commerce and industry, as exemplified by a recent Suffolk County law regulating the use of video display terminals, is poisoning the business climate.







## CHAPTER 9...

# PRESERVING A VIABLE BASE OF SMALL DEFENSE CONTRACTORS

The economic vitality and viability of Long Island's defense sector depends in large measure on the availability of a stable, competitive and diverse base of second and third-tier defense suppliers. The existence of a large base of subcontractors who can give the defense establishment a *quality* product at the lowest possible price is also vital to the nation's security.

Nationally, over half the dollars for defense material acquisition go to subcontractors and parts suppliers at the lower tiers of the defense industry. On Long Island, small defense suppliers are a vital part of the defense industry and contribute materially to the Long Island economy. In fiscal year 1986, for example, 510 Long Island defense suppliers received awards from the Department of Defense. Approximately 34% of these firms received awards valued at less than \$100,000. An additional 21% received awards valued at between \$100,000 and \$250,000. By contrast, fewer than 20% of Long Island defense suppliers received awards valued at more than \$1 million.

**Table 9.1**  
**Number of Long Island Firms Receiving Defense Department Awards, by Size of Award, Fiscal Year 1986**

Size of Award	No. of Firms	Percent Distribution
Over \$1 Million	101	19.8%
\$500,000 - \$999,999	68	13.3
\$250,000 - \$499,999	61	12.0
\$100,000 - \$249,999	105	20.6
Under \$100,000	175	34.3
<b>Total</b>	<b>510</b>	<b>100.0</b>

Source: DMS Marketing Service

The nation's defense buildup, which has been in progress since 1981, is now winding down. Fewer major contracts are on the horizon. This means more intense competition among prime contractors for available defense work. It will also mean fewer business opportunities for second and third-tier subcontractors because as the overall volume of business diminishes, the primes will tend to keep more of the work in-house.

This chapter analyzes the mechanisms by which small defense suppliers and disadvantaged small defense suppliers are apprised of opportunities to bid for defense work. It discusses the mechanisms which assure that small businesses on Long Island receive their fair share of available defense work. The final section pinpoints areas of weakness in the overall process, discusses the obstacles to maintaining a base of small defense suppliers on Long Island and suggests possible solutions.

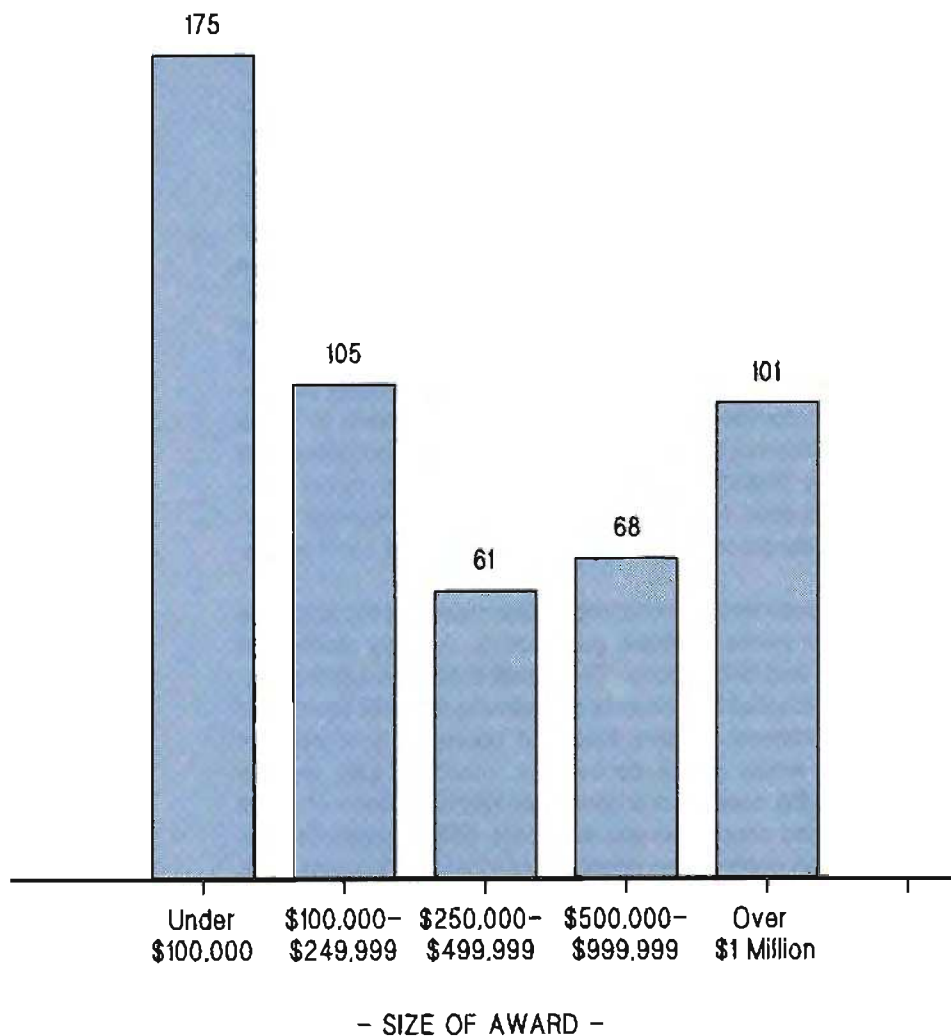


The following persons were interviewed in developing this material:

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John Richards <i>Defense Contract Administration</i> <i>Services Management Area</i>	Defense Logistics Agency	605 Stewart Avenue Garden City, N.Y. 11530
Elinor Rutherford <i>Asst. to Supervisor,</i> <i>Procurement</i>	Fairchild Systems	300 Robbins Lane Syosset, N.Y. 11791
Robert Simon <i>Vice President,</i> <i>Corporate Procurement</i>	Grumman Corporation	Bethpage, N.Y. 11714
Frank Sorrentino <i>Director, Procurement,</i> <i>Minority and Small Business</i>	Grumman Corporation	Bethpage, N.Y. 11714
M. John Ward <i>Professional Engineer</i>	U.S. Small Business Administration	35 Pinelawn Rd. Melville, N.Y. 11747



**Figure 9.1**  
**NUMBER OF LONG ISLAND FIRMS RECEIVING**  
**DEFENSE DEPARTMENT AWARDS,**  
**by SIZE OF AWARD, FISCAL YEAR 1986**



Source: DMS Marketing Service

## THE BIDDING PROCESS FROM the PERSPECTIVE of LONG ISLAND'S PRIME CONTRACTORS

Long Island's prime contractors have active, on-going programs designed to solicit subcontractors, particularly small businesses, for needed products. All solicit quotations nationwide and participate in procurement conferences on Long Island, in the New York Metropolitan Region and throughout the nation. They maintain bidders lists, receive solicitations through the Commerce Business Daily and have an *open door* policy toward salesmen from smaller firms.

The Small Business Liason Officers at Long Island's major prime contractors view their mission as helping to establish small businesses as viable competitors within the defense establishment. To this end, they actively render assistance to current and potential subcontractors. For example, they *qualify* their subcontractors. That is, they may send their own personnel to the subcontractor's facility to evaluate its financial viability. Their personnel also perform quality assurance surveys. Firms that fail to pass such scrutiny are often advised about how to remedy the defect and are then resurveyed. Once a contract is awarded to a given small business, the prime contractor provides counseling in engineering, management and quality assurance. They ensure that the subcontractor understands the blueprints and the needs of the *prime*. They also monitor the quality of the product at the source and assist the subcontractor in remedying any defects.

The approach of each of Long Island's major defense firms toward its subcontractors and potential subcontractors is relatively similar. The Grumman Corporation asks potential subcontractors to complete a facilities questionnaire which indicates the service, process and/or commodity categories under which the firm wishes to be listed in the potential seller record. The questionnaire asks for information about key technical personnel, their experience and special qualifications. It requests relevant financial data and information about the type, age and condition of present production equipment and about product characteristics and price. Using this information, Grumman has compiled a master sellers list. In 1986, the Grumman Corporation handled 8,000 subcontractors. Of these, 6,000 were small businesses and 1,650 were located on Long Island. In calendar year 1986, Grumman paid approximately \$214 million to small business suppliers located on Long Island.



Fairchild Weston uses its data base of qualified suppliers to solicit potential suppliers. The Company also maintains a directory of small disadvantaged suppliers and, like most other Long Island *primes*, belongs to the New York-New Jersey Minority Purchasing Council. In 1987, Fairchild Weston had sales of approximately \$150 million. Of this amount, approximately \$45 million went out as purchasing and subcontracts and 60% of this total, about \$27 million, went to small businesses located primarily in the New York-New Jersey Metropolitan Area.

The General Instrument Corporation deals with approximately 400 subcontractors annually. Of these, approximately 300 are small businesses and 200 are located on Long Island. The company maximizes subcontracting opportunities for small firms. Although it performs engineering, assembly and testing in-house, it generally subcontracts to small suppliers for the production of individual parts.

The Shipboard and Ground Systems Group of Unisys assembles gun fire control and radar equipment. The Group's mission requires that it subcontract for thousands of separate parts. The Company relies heavily on Long Island-based contractors for machinery and sheet metal work. Long Island has adequate personnel and equipment in these areas and local firms are regarded as competitive in terms of production costs. Unisys has also established a task force devoted to the needs of small, disadvantaged businesses; all key Unisys purchasing locations are represented on this task force.

## MONITORING the PRIMES

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An extensive monitoring network assures that Long Island's prime contractors give a *fair share* of their Defense Department work to qualified small businesses. The Defense Logistics Agency, the U.S. Small Business Administration and Air Force and Naval plant representatives are part of this network.

The mission of the Defense Logistics Agency is to develop a base of small firms to function as defense suppliers in time of war. A secondary goal is to obtain quality products and services for the defense establishment at the lowest possible price. Small business is defined by Part 19 of the Federal Acquisition Regulations (FAR); this designation generally refers to firms with 500 or fewer employees.

The Defense Logistics Agency performs its mission in several ways. Under Public Law 95-507, prime contractors must submit form 640 to the Defense Logistics Agency on all contracts valued at \$500,000 or more. This form indicates what proportion of the contract is going to small businesses. Representatives of the Defense Logistics Agency review the files of each prime contractor to assure that the data submitted on form 640 are correct. Form 640 provides a comprehensive review of each contractor's subcontracting program. It seeks to establish whether the contractor's Small Business Liaison Officer has the authority and responsibility to administer small business programs effectively, whether the firm offers incentive programs for buyers and technicians who assist small business firms and to what extent the contractor offers counseling, technical, financial and other assistance to small business firms. Representatives of the Defense Logistics Agency also evaluate whether the contractor submits reports SF 294 and SF 295 in a timely and accurate manner. The SF 295 report is submitted quarterly. It shows subcontract dollars for the entire facility and indicates what proportion of the total went to small and small disadvantaged businesses. The SF 294 report is submitted semi-annually and indicates what proportion of individual subcontracts went to small business. The Defense Logistics Agency also performs pre-award surveys of Long Island firms that seek to become prime contractors. In fiscal year 1987, the Defense Logistics Agency completed forty pre-award surveys involving Long Island contractors.

The U.S. Small Business Administration also monitors the activities of Long Island's prime defense contractors. Agency personnel review 294, 295 and 640 reports. The Small Business Administration also counsels small businesses concerning the procedures for getting on government bidders lists and sponsors procurement conferences at which prime contractors interface with smaller suppliers. The SBA maintains a computerized data base of small and disadvantaged small business suppliers. SBA representatives ascertain the procurement requirements of local prime contractors and utilize this computerized data base to locate small companies with the appropriate capabilities.

Air Force and Naval plant representatives also review the subcontracting plans of Long Island's prime contractors and help to assure that each has an aggressive program to locate small and disadvantaged small business suppliers. Plant representatives review



form 640 for those prime contractors whose contracts are not assigned to the Defense Logistics Agency for administration. Grumman, Unisys and Eaton/AIL are in this category. Plant representatives also receive direct solicitations from small business and respond with the names of appropriate contacts at the prime contractor and at various government agencies.

## THE PROCUREMENT TECHNICAL ASSISTANCE PROGRAM

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Counseling for small and disadvantaged small businesses interested in doing defense work is also available through the Long Island Development Corporation. The Defense Logistics Agency, under a Department of Defense Cooperative Agreement, has established the Long Island Development Corporation as an authorized source of Department of Defense procurement information, guidance and advice to small business firms. Its program, called the Procurement Technical Assistance Program (PTA), is designed to expand the base of defense suppliers and to increase competition in procuring defense-oriented goods and services. The program provides counseling with regard to:

1. Marketing products and services to the Department of Defense and to contractor buying offices;
2. Becoming qualified competitive bidders for Department of Defense procurements;
3. Getting on bidders' lists and receiving bid solicitations;
4. Preparing bids and getting ready for pre-award surveys;
5. Obtaining and clarifying procurement regulations and technical information;
6. Meeting the terms of contracts and properly administering awards;
7. Resolving post-award problems, and;
8. Establishing a good performance record and becoming a desirable follow-on bidder.

The Procurement Technical Assistance Program started on Long Island in 1986 when two Long Island institutions, the Long Island Development Corporation and the Long Island Area Development Agency, negotiated cooperative agreements with the Defense Logistics Agency. The contract with the Long Island Area Development Agency ended in September, 1987 and the Agency has since turned over its files to the Long Island Development Corporation. The Long Island Development Corporation program is slated to be funded by the Department of Defense through December 7, 1988, after which the entire effort is designed to become self-supporting. Defense Department funding has been awarded on a cost reimbursable basis, which means that the Long Island Development Corporation must match each dollar of DOD funding with a dollar of cash or in-kind contributions. The non-federal share is coming from the seven Long Island Industrial Development Agencies: Nassau IDA, Suffolk IDA, Hempstead IDA, Islip IDA, Babylon IDA, Brookhaven IDA and Riverhead IDA.

The goal of the PTA program is to bring small businesses as close to potential buyers as possible. The program embodies three elements: outreach, networking and counseling. As part of the outreach element, the LIDC sent some 5,000 letters to Long Island firms advising them of the program's existence. The letters contained an *interest inquiry* which identified the firm, its type of business and its interest in DOD work. As part of the networking process, the LIDC got in touch with DOD buying activities throughout the nation and ascertained the products and services that they purchase. The LIDC also contacted Long Island aerospace firms to determine their procurement needs.

The LIDC has devoted considerable attention to preparing potential bidders for pre-award surveys. Bidders are subject to such surveys if the government has no knowledge of the bidder or if the award is valued at \$25,000 or more. The pre-award survey covers financial, technical and manufacturing responsibility, quality control, adequacy of the accounting system, ability to meet delivery schedules, packaging capability, shipping facilities and plant safety. As of January, 1988, three firms counseled by the Long Island Development Corporation received contracts totaling \$480,000 and one has received tentative approval for an additional \$1.5 million.



## DIFFICULTIES FACED by SMALL CONTRACTORS

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There appear to be a number of problems associated with efforts to maintain a viable base of second and third-tier defense suppliers on Long Island. The major difficulties are as follows:

1. Inadequate capital for plant and equipment; inadequate working capital;
2. Inadequate technical expertise;
3. Poor fit vis-a-vis the required product mix of local prime contractors;
4. Lack of appropriate contacts on the part of subcontractors; failure to pursue timely follow-up actions.
5. Inadequate knowledge about how to do business with the Department of Defense.

The foregoing problems are particularly acute for small business and disadvantaged small business suppliers. Some of these problems appear to have been exacerbated by recent Department of Defense policy actions.

**Capital Inadequacies.** Inadequate capitalization is a fundamental problem. At present, the U.S. Small Business Administration guarantees bank loans of up to \$500,000 provided that a company can demonstrate reasonable assurance that it has the ability to repay the loan. In fiscal year 1987, 100 S.B.A. - guaranteed loans totaling \$24 million were made to Nassau-Suffolk firms. However, \$500,000 is often insufficient to purchase the sophisticated machinery and equipment needed by potential defense suppliers. For example, approximately \$2 million is needed for one wafer line and an additional \$3 to \$4 million must be invested to develop complete facilities for manufacturing integrated circuits. Although some business development money for machinery and equipment is available for disadvantaged small businesses under the Small Business Administration's 8A program, the eligibility standards for this program have been tightened and it takes an average of more than two years just to be admitted to the program. Moreover, admission to the program is no guarantee of work.

The Small Business Administration must first obtain a contract from a buying activity, which it then subcontracts to the disadvantaged small business. New York State has recently made available \$100 million for small business through the New York State Business Development Corporation, which is operated by the State's banks. However, the limits on individual loans from this source are also likely to be relatively stringent.

The lack of adequate capitalization means that there are some areas of technology in which small firms can't compete. Long Island currently appears to have an adequate base of subcontractors for machining and sheet metal work. However, local firms must go to Canada, the midwest, Route 128 around Boston and the west coast for microwave sources and printed circuit boards. Microwave components require sophisticated test equipment and the industry is therefore relatively capital intensive. The production of printed circuit boards involves the use of toxic chemicals. Such manufacturers would require recycling facilities, which are costly, if they were to locate on Long Island. Inadequate working capital means that most small business suppliers are low budget operations. Many are not sufficiently large to have the special production runs required by some prime contractors. Inadequate capitalization means that they are often strapped for cash, that they require progress payments and that they often have difficulty in meeting delivery schedules.

Two actions may help to assure a more adequate supply of capital to small defense suppliers located on Long Island. The ceiling on S.B.A.-guaranteed loans should be raised to a more realistic level, given the sophisticated machinery and equipment needed and the relatively high cost of doing business on Long Island. Another possibility is for the Department of Defense itself to provide and/or guarantee capital equipment loans to qualified small defense suppliers. Such an investment may ultimately prove to be a small price to pay to preserve a viable base of small defense suppliers on Long Island and elsewhere in the nation.

**Inadequate Technical Expertise.** Long Island is a high-cost area. Its housing costs in particular have become prohibitive. Until now, the technical expertise of Long Island's labor force, particularly its expertise for design work, has been sufficient to offset Long Island's cost disadvantages. Long Island has a number of fine universities with appropriate engineering and technical programs.



Long Island's prime contractors also enhance the technical expertise of their subcontractors by sending their own engineers on a routine basis to the subcontractor's plant to help them get started.

However, with the volume of knowledge required by new defense programs increasing exponentially, it is necessary to enhance the technical expertise of Long Island's second and third-tier defense suppliers. A better exchange of technical information between prime contractors and subcontractors is needed. Such exchanges could occur at technical symposiums sponsored by Long Island's large prime contractors. Other mechanisms to transfer technology to small businesses should also be considered.

**Poor Fit of Product Mix.** Many small Long Island defense suppliers and potential suppliers do not manufacture the products needed by Long Island's prime contractors. This is largely a function of their small size and inadequate levels of capitalization. For example, Grumman and other airframe companies are constrained in the types of equipment that they can purchase from small businesses located on Long Island. Aircraft engines can only be purchased from General Electric or Pratt and Whitney. Specialized radar can only be supplied by large firms.

This situation reflects the nature of the business. There are no easy solutions to the problem.

**Lack of Appropriate Contacts, Timely Follow-Up.** There appears to be an urgent need to bring small defense suppliers and potential suppliers into contact with prime contractors and Department of Defense buying activities in a more effective manner. With fewer Defense Department contracts on the horizon and more intense competition for those contracts, Long Island subcontractors must learn to do business not only with Long Island *primes* but also with prime contractors located throughout the nation and directly with DOD buying activities.

The Procurement Assistance Unit of the New York State Department of Economic Development is already doing useful work in this area. It is bringing local New York State subcontractors directly to those defense buying activities with which they are not currently doing much business. It is also bringing New York State subcontractors to other parts of the nation to meet with prime contractors located outside of New York State.

In 1985, the Agency brought New York State subcontractors to Los Angeles to meet with prime contractors located on the west coast, in an effort to break their dependence on local firms. In the spring of 1988, the agency brought representatives of large defense installations and large prime contractors located throughout the nation to meet on Long Island with Fairchild-Republic's former subcontractors.

Greater efforts in this direction would appear to be warranted. Quarterly Long Island trade fairs, to which major prime contractors throughout the nation are invited, are one possibility. Additional trips which bring Long Island subcontractors to defense industry trade fairs in California, Texas and Florida should also be investigated. Joint sponsorship and financing of these trips by the New York State Department of Economic Development and the U.S. Department of Defense should be considered. In this respect, the U.S. could emulate the Canadian model. Canada currently uses its Defense and Commerce Departments jointly to promote such trade fairs.

Once appropriate contacts are made, it is vital that small business firms be counseled to make regular follow-up visits or contacts with prime contractors or DOD buying activities to ascertain their ongoing procurement needs. Several of the prime contractors interviewed indicated that most small business suppliers fail to make timely follow-up visits.

**Lack of Knowledge About Dealing with the Department of Defense.** The interviews indicated that Long Island's small defense suppliers require additional counseling on how to do business with the Department of Defense. Many of them don't understand what's involved in the bidding process or how the payments process works. They require help in filling out form 129 to get on a bidders list and in sending it to the appropriate buying activity. Small businesses require assistance in distinguishing between an invitation for bid, which involves a firm fixed price, and requests for quotes or proposals, where the price is negotiable. Many need help in bid and proposal preparation; some don't fully understand the specifications they'll be required to meet. Some suppliers are not familiar with post-award requirements, such as periodic inspections.



Hofstra University currently offers eight courses on government contracting. They are taught by lawyers in the field of government contracting. Additional seminars on the subject could be sponsored by the New York-New Jersey Minority Purchasing Council and other small business groups. Another alternative would be to beef up the Defense Logistics Agency or the Small Business Administration with personnel who have the management expertise to help small business and the necessary experience in government contracting.

**The Impact of Department of Defense Policies.** It has long been recognized that Defense Department policies have a major impact on the nation's ability to maintain a viable base of second and third-tier defense suppliers. In his seminal work, *The Defense Industry*, Jacques S. Gansler notes: "In spite of the fact that over half the dollars for defense material acquisition are expended at the lower tiers of the industry, there is almost no recognition by government policymakers of the significant qualitative differences in structure, conduct and performance between the business done with the subcontractors and parts suppliers and that done with the large prime contractors."<sup>7</sup> He notes that the government applies uniform rules to both prime contractors and subcontractors. This has caused a number of problems. In the past, the DOD has, in effect, underwritten the *primes* financially. By contrast, subcontractors are required to supply their own plants, equipment and money. Gansler notes that they receive a relatively low rate of return on their investment in comparison with prime contractors and in comparison with small contractors in the civilian sector. In addition, the growing complexity of weapons systems has led to high-technology, capital-intensive specialization among subcontractors and parts suppliers which, in turn, has reduced the number of lower-tier suppliers of critical parts. Gansler suggests that DOD policies have reinforced the shrinkage of the lower-tier supplier base by creating obstacles to the entry of new subcontractors. These obstacles include unduly specialized military specifications, lengthy gestation periods, low profit margins and the high uncertainty of continued project funding. The danger is that the shrinkage of suppliers at the subcontractor level will cause industrial bottlenecks that will impair the nation's defense preparedness in a crisis situation. Moreover, as subcontractors leave the defense business, monopoly conditions will prevail more often at the subcontractor level.

<sup>7</sup>Jacques S. Gansler, *The Defense Industry* (Cambridge, Mass: The MIT Press, 1980), P. 160.

Changes in government policy could assure a more vibrant, competitive base of second and third-tier defense suppliers both on Long Island and nationally. The assumption that prime contractors are taking care of their *subs* is probably erroneous. There do not appear to be sufficient financial incentives for Long Island's prime contractors to train and nurture small defense suppliers. Under Public Law 99-661, government agencies are allowed to pay a premium to small disadvantaged suppliers. The nation's prime contractors should be allowed to do so as well. Gansler also suggests that the DOD can help subcontractors by assuming part of the risk of the defense business. For example, the DOD could assist subcontractors in raising investment capital through indemnification.

At present, the Defense Department is emphasizing greater competition among suppliers and greater investment by suppliers in facilities and equipment. The growing emphasis on competition can actually help to destroy Long Island's base of small suppliers. Not only will their profit margins be squeezed but as the profit margins of the area's prime contractors are squeezed by more intense competition, they may be forced to subcontract to firms in low-cost areas such as the Caribbean. This will take jobs away from Long Island.

## CONCLUSIONS

### Preserving a Viable Base of Small Defense Contractors

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Long Island's base of small defense suppliers appears to be threatened by growing competition in the defense industry and by the *winding down* of major defense programs affecting Long Island firms. Several remedial actions are needed to keep these suppliers viable. These include:

1. additional counseling on how to do business directly with the Defense Department;
2. better financing mechanisms for both capital equipment and working capital;
3. more local trade fairs and/or trips to distant trade fairs to bring Long Island's subcontractors into contact more effectively with distant prime contractors.



## CHAPTER 10...

# AN ACTION PLAN FOR ECONOMIC GROWTH ON LONG ISLAND

The foregoing chapters suggest that Long Island's defense sector is entering a period of change that is likely to transform the industry and dramatically alter its role in the Long Island economy. This chapter discusses the actions needed to stabilize the defense industry on Long Island and to mitigate the impact of the anticipated downturn in defense spending. It also explores mechanisms for enhancing the overall competitiveness of Long Island industry. If implemented, these mechanisms could benefit both defense and non-defense firms. The following areas will be covered:

- 1.. Modifying Defense Department procurement policies.
2. Utilizing Long Island's potential for high-technology activities.
3. Supporting the growth of small manufacturing firms.
4. Developing business-education partnerships.
5. Enhancing outplacement and retraining activities in the defense sector.

### MODIFYING DEFENSE DEPARTMENT PROCUREMENT POLICIES

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In recent years, the pendulum in defense procurement has moved from inefficient and costly cost-plus contracts to intense pressure on defense contractors to cut costs, accept lower profit margins and bear a greater share of the financial risk inherent in defense contracting. The net effect has been to increase the level of up-front contractor investment, to extend the period of time needed to recoup that investment and to reduce the anticipated return to the contractor.

According to the Financial Executives Institute, current earnings levels in the defense industry do not adequately compensate defense contractors for the risks involved. Moreover, the once cooperative relationship between the Pentagon and its defense suppliers has degenerated into an adversary relationship which could lead to deterioration of the defense industry base.



The Financial Executives Institute found that as a result of recent policy changes, defense contractors are likely to underinvest in plant and facilities and to bypass the latest manufacturing technologies. In addition, investment opportunities outside the defense industry may become more attractive than opportunities within the industry so that the defense industry base could contract, U.S. defense contractors could lose their competitive edge in international markets and the U.S. defense industry could lose its global lead in technology.

It is clear that there must be a better balance between Defense Department needs for cost-effective, high-quality weapons production incorporating the latest technologies and the need to maintain an economically viable defense industry base. The MAC Group, a management consulting firm in Cambridge, Massachusetts, in their report, *The Impact on Defense Industrial Capability of Changes in Procurement and Tax Policy, 1984-1987*, suggested that Congress and the Defense Department clearly define national security and industrial base requirements and then test existing procurement policies and projected policy changes against these requirements. The MAC Group also called for a senior policy board to advise on industrial base matters and suggested that the Defense Department provide additional incentives for contractor investment in research and development, physical facilities and human resources.

If existing Defense Department procurement policies are maintained and the basic risk-return equation for defense contractors remains unbalanced, Long Island's defense industry cannot thrive.

## UTILIZING LONG ISLAND'S POTENTIAL FOR HIGH TECHNOLOGY ACTIVITIES

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Even if Pentagon policies are modified to redress the growing imbalance between risks and returns within the defense sector, the realities of the Federal budget deficit mean that defense spending will decline in real terms in the years ahead. In addition, fewer major weapons programs are anticipated. This means that Long Island must fully exploit its other resources, including the potential for high value-added technological activities.

Basic ground-breaking innovations involving new technologies tend to occur in clusters. These bursts of innovation create new product, processes and industries. A number of analysts believe that the world is currently on the threshold of the next history-changing group of basic innovations. The rationale for this prediction is as follows: the post-war period has been largely dominated by technologies developed during and prior to World War II. The applications of these technologies have now been fully realized. In this situation, the return to capital tends to decline and investors, seeking a better return on their capital, begin to invest in more risky ventures. They invest in promising new fields, which ultimately generates new clusters of basic innovations.

Experts suggest that we are currently at that stage in the innovative cycle where investment capital flows from mature industries into new and untested technologies. If we are on the verge of a new round of technical innovations, Long Island, with its unique educational facilities and technically-trained manpower, is well positioned to be at the forefront of these developments. The following industries are likely to be the major high-technology growth industries of the 1990s:

**Semi-Conductors and Integrated Circuits.** This industry produces semi-conductor components and silicon chips. Improvements in electronic and computation equipment suggest that these products will be in strong demand over the next decade. The market for very large scale integrated circuits will be particularly strong.

**Microprocessor Applications.** Microprocessors operate in conjunction with the memory circuits and input-output devices that are the basis of many computer-type capabilities. In the next several years, micro-electronic intelligence is likely to be incorporated into a wider range of products including automobile engine and dashboard controls, home computers and home appliances.

**Computer Software.** The computer software industry will grow rapidly as uses for personal and business computers proliferate.

**Electronic Information and Communications Systems.** This is likely to be a major growth industry. Its applications include electronic funds transfers, television-related catalog shopping, electronic newspapers and home security systems.



**Genetic Engineering.** This industry involves the manipulation of genetic material to control hereditary traits. It involves gene splicing, monoclonal antibody technology and germ plasma development. The most immediate applications will be in the pharmaceutical area and will include hormones, vaccines, insulin and cancer-fighting drugs.

**Fiber Optics.** Fiber optics are used for communications and signal transmission. There will be substantial new applications for optical fibers in telephone communications, computers and military electronics.

**Automation.** Industrial robots and other automated equipment are expected to be more widely used during the 1990s as U.S. industry seeks to become more competitive in global markets.

**Medical Diagnostics.** New breakthroughs in biochemical and physical diagnostic equipment are expected. The emphasis will be on home diagnosis kits and on automated testing equipment. There will also be new applications for laser techniques.

**Energy Production and Conservation.** New instruments that manage energy more efficiently will be developed. There are also growth possibilities in photo voltaics and other solar technologies, cogeneration equipment and energy-saving appliances.

Other promising fields include advanced composite materials, propulsion systems, advanced sensors and artificial intelligence.

Long Island already has a relatively large high-technology presence. A recent report by the Public Policy Institute entitled *High Technology Industries, The New York State Perspective* found that as of 1984, Nassau-Suffolk, with 93,400 high-technology jobs, led all other labor market areas in the state in terms of high-technology employment. It found that high-technology employment accounted for 9.1% of Nassau-Suffolk's jobs and for 52.5% of its manufacturing jobs. The report also showed that high-technology employment on Long Island grew by 32.3% between 1975 and 1984. Thus, Long Island was second only to the Poughkeepsie area in terms of the rate of growth of high-technology jobs. The report classified an industry as a high-technology industry if the ratio of technology-oriented workers to total workers was equal to or greater than the national average for all manufacturing industries (6.3%) and if the ratio of research and development expenditures to sales was close to or above the average for all industries (3.1%).

This definition resulted in the inclusion of the following industries, among others: industrial organic and inorganic chemicals, plastics, drugs, agricultural chemicals, ordnance, engines and turbines, special industry machinery, office and computing machines, electric distributing equipment, electrical industrial apparatus, radio and TV receiving equipment, communications equipment, electronic components and accessories, aircraft and parts, missiles, engineering and scientific instruments, measuring and controlling devices, optical and medical instruments and photographic equipment and supplies.

A recent analysis of high-technology activity on Long Island, prepared by Peat, Marwick, Mitchell and Company, showed that Long Island contained some 1,964 high-technology firms or about 13% of the 14,891 high-technology firms it identified in the Tri-State New York Region. Peat, Marwick defined high-technology companies to include the following broad fields: electrical and electronic equipment, systems, components, software, services and supplies; telecommunications; biotechnology; aerospace equipment and technology, excluding airlines; pharmaceuticals; specialty chemicals; materials research; medical technology and equipment; scientific and technical equipment; research and development laboratories; and, lessors of high technology-specific equipment. Like the report by the Public Policy Institute, the Peat, Marwick report concluded that Long Island has an established high-technology presence and that the potential for further expansion exists. The report notes that established high-technology centers have certain common characteristics. They generally enjoy a high volume of government contracts and are centered around major universities that conduct research and supply a technically-trained workforce. In addition, a network involving relationships between *friends, business associates* and professional service firms is generally recognized as conducive to the growth of high-technology activities. Friends and business associates are drawn from emerging high-technology companies, colleges and universities, government agencies, trade groups and professional associations. Professional service firms include law firms, accounting firms, venture capitalists, commercial and investment banks, advertising and public relations firms. According to Peat, Marwick, most of the components of this network are already in place on Long Island.<sup>8</sup>

<sup>8</sup>*Long Island High Technology Profile.* A study prepared by Peat, Marwick, Mitchell & Co., Jericho, New York in conjunction with Thomas & Co., Palo Alto, California, 1985.



**Table 10.1**  
**1984 High Technology Employment Patterns**  
**Nassau-Suffolk vs. Other New York State Labor Market Areas**

Area	High Technology Employment, 1984	% Change 1975-84	High Technology Total Employment	Employment as % of Manufacturing Employment
Nassau-Suffolk	93,400	32.3	9.1	52.5
Rochester	89,800	0.2	20.6	60.3
New York City	48,000	24.7	1.4	11.1
Rock/West/Putnam	37,200	21.6	7.7	43.3
Binghamton	31,100	31.8	26.9	76.0
Poughkeepsie	28,500	43.9	25.8	82.8
Buffalo	23,300	-21.8	4.9	22.3
Syracuse	22,800	18.8	8.2	39.0
Albany	19,100	-26.0	5.2	34.7
Utica-Rome	9,600	-15.8	8.3	34.8
Glens Falls	4,500	25.0	11.0	44.1
Orange County	3,900	30.0	4.5	25.8
Elmira	2,500	-49.0	7.2	30.5

Source: The Public Policy Institute, *High Technology Industries, The New York State Perspective*, April, 1986, Table 4, P. 16.

The key elements in Long Island's high-technology infrastructure are as follows:

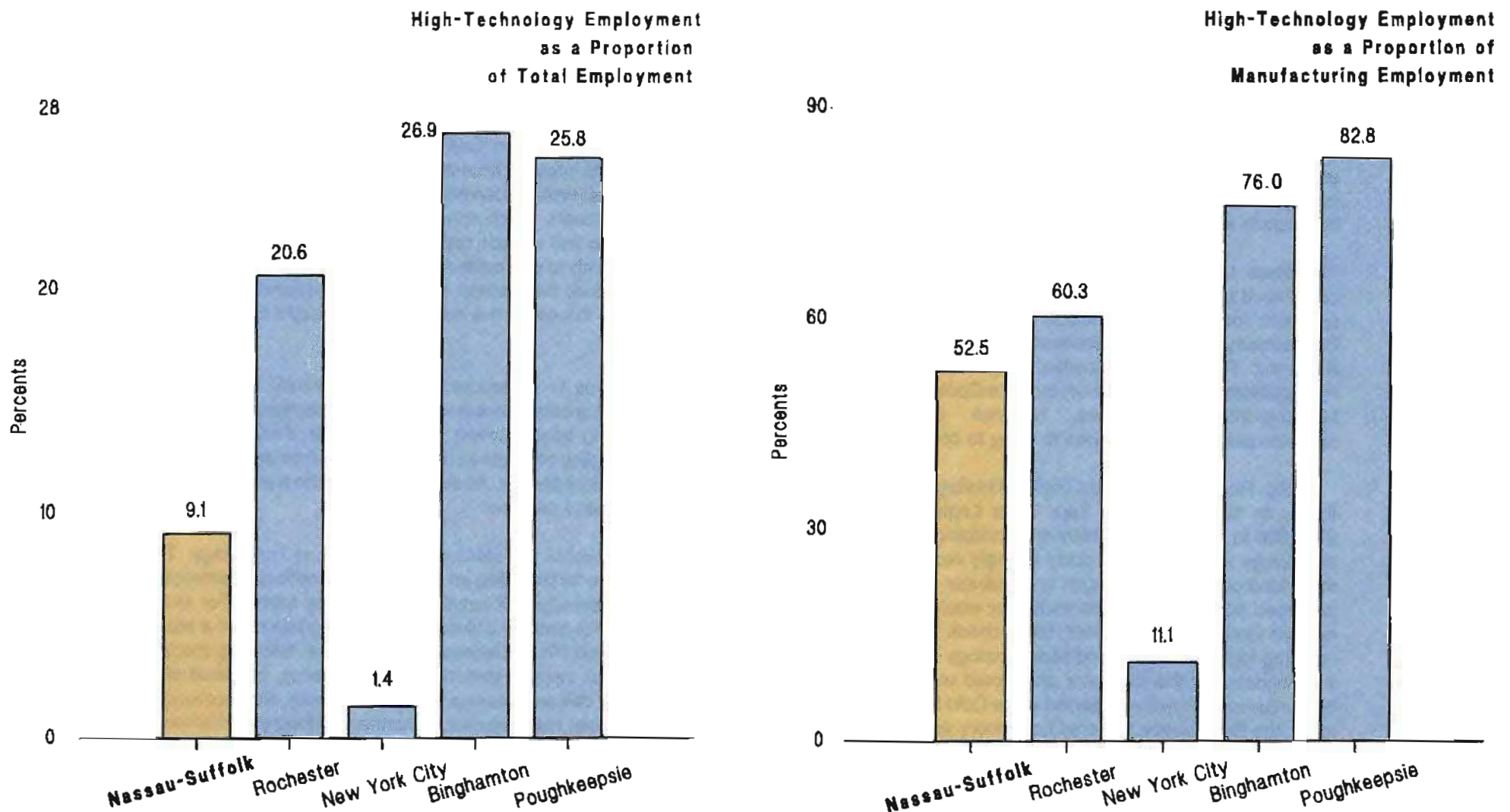
**1. Brookhaven National Laboratory (BNL).** Brookhaven National Laboratory is one of the nation's top research centers. It does pioneering work in the physical, biomedical and environmental sciences. The 41-year old laboratory employs about 3,500 scientists and technicians. It is home to the National Synchrotron Light Source. Its scientists recently developed a concrete polymer material that won't absorb water and has great bending strength; this material is now being used to patch highways. The Laboratory is the focal point of a drive to apply x-ray lithography, a technique for transferring circuit patterns onto wafers, to the production of the next generation of microchips. This program is vital to U.S. efforts to remain competitive in the global market for semiconductors. If the Laboratory successfully develops the machines to produce the next generation of chips, a new multi-million dollar industry could be generated on Long Island.

The Laboratory is attempting to transform an empty 4,000 square foot building on its site into an incubator for fledgling high-technology companies. Firms will pay a charge equal to the cost of renting commercial industrial space and a fee for access to laboratory researchers and equipment.

**2. Cold Spring Harbor Laboratory.** The Laboratory is one of the premier centers of biological research. Its scientists include three Nobel Laureates: James Watson, the director and co-discoverer of the structure of DNA, and geneticists Alfred D. Hershey and Barbara McClintock. The Laboratory, founded 97 years ago as a biological station, has 350 employees and is in operation 24 hours a day, seven days a week. Its work has focused on plant genetics, cancer research and, more recently, on the virus that causes AIDS. The Laboratory is adding a \$5 million auditorium. At present, 4,000 persons attend scientific meetings at the Laboratory annually.



**Figure 10.1**  
**HIGH TECHNOLOGY EMPLOYMENT, 1984**  
**NASSAU-SUFFOLK vs. SELECTED NEW YORK STATE LABOR MARKETS**  
**(percents)**



Source: The Public Policy Institute



The Laboratory recently received a \$7 million grant from the Howard Hughes Medical Institute in Bethesda, Maryland. The money will be used for a new laboratory building to study neuroscience and will also help finance an expanded program of symposiums.

**3. Center for Biotechnology, State University of New York at Stony Brook.** New York State has designated seven Centers for Advanced Technology. They are cooperative research and development centers formed by the joint efforts of universities, industry and government. They are intended to meet the need for increased investment in applied research and development, to assure that current education and training programs meet the emerging needs of technology-based industries, and to improve the linkages between businesses and universities.

The State University of New York at Stony Brook has been designated as a Center for Medical Biotechnology. The corporate sponsors for the Center include Pfizer, Warner-Lambert, Enzo Biochemistry, Eli-Lilly, University Genetics, Behringwerke, Academic Research Associates, Toyo Jozo, Interstate Drug, Harco Electronics, and Zimmer, Inc. The Center currently supports twenty-to-thirty early-phase, high-risk corporate-sponsored research projects that it hopes to bring to commercialization.

**4. The Planned Long Island High-Technology Incubator at Stony Brook.** In 1986, the New York State Legislature appropriated \$700,000 to study the feasibility of developing a Long Island high-technology incubator. The study strongly recommended that the state fund construction of such an incubator at Stony Brook. The proposed 50,000 square foot incubator would operate independently on land donated by SUNY, Stony Brook. About fifteen to thirty fledgling high-technology and biotechnology businesses could be accommodated at the incubator and would utilize the University's resources as well as the expertise at the Cold Spring Harbor Laboratory, the Brookhaven National Laboratory and other Long Island colleges and universities. Incubator planners hope to obtain state and other public and private funding and to start construction of the facility sometime in 1989.

The incubator's mission will be to create an environment in which new and technologically innovative businesses can develop and grow through interaction with the university's research community,

thereby fostering economic development and technology transfer as well as enhancing the educational mission of the university. The incubator would provide low-cost, high-quality space, business advisory services, shared overhead services and potential access to financial capital. It is expected that most *graduates* of the incubator would remain on Long Island based on the track records of similar incubators across the country. The proposed incubator will give Long Island the opportunity to become a national center for the biotechnology industry.

**5. Access to Venture Capital.** A number of groups have been organized to provide access to venture capital for fledgling Long Island firms. Hofstra University sponsors the Long Island Venture Capital Network which meets monthly. Its goal is to bring entrepreneurs and venture capitalists together and to give inventors an opportunity to present their ideas to the people with the capital to commercialize those ideas. In addition, experienced businessmen share with the group the methods that brought them commercial success.

Polyventures is a venture capital fund jointly administered by several Long Island investors and by Polytechnic Institute of New York's Long Island Center at Farmingdale. Polytechnic Institute offers fledgling companies technical know-how and functions as a special limited partner. As such, it is entitled to a share of the profits of the general partners.

**6. Educational Infrastructure in Science and Technology.** The infrastructure for providing an advanced scientific and technical education is already well established on Long Island. For example, Brooklyn Polytechnic University at Farmingdale offers a Master of Science and Ph.D. Degree in each of the following disciplines: aeronautics, applied statistics, bioengineering, chemical physics, chemistry, civil engineering, computer science, electrical engineering, industrial mathematics, industrial engineering, mathematics, materials science, mechanical engineering, physics, polymer engineering, systems engineering and transportation engineering. The State University of New York at Stony Brook offers an M.S. and Ph.D. in each of the following fields: applied mathematics and statistics, chemistry, computer science, earth and space sciences, economics, electrical engineering, materials science, mathematics, mechanical engineering and physics.



As the foregoing analysis suggests, Long Island is rich in the financial and technical resources needed to enhance its existing high-technology base and assure the strong future growth of high-technology activities. However, as the Peat, Marwick report notes: "What seems to be missing on Long Island is a stronger linkage between the professional service pool and the *old boys*, the academics/state agencies and the emerging high-tech companies".<sup>9</sup> These linkages must be reinforced if Long Island is to achieve its full potential as a center for high-technology activity.

## SUPPORTING the GROWTH of SMALL MANUFACTURING FIRMS

The Long Island economy is a small business economy. Approximately 80% of all bi-county establishments employed fewer than ten workers in 1985. Hence, it makes sense to adopt strategies that improve the business climate for small businesses, particularly small manufacturing businesses. Chapter 9 discussed some remedial actions to keep small defense suppliers viable. They included:

1. additional counseling on how to do business directly with the Defense Department;
2. better financing mechanisms for capital equipment and working capital; and,
3. trade fairs and similar vehicles to bring Long Island's subcontractors into contact with distant prime contractors.

Other mechanisms are needed to assist small manufacturing firms in both defense and non-defense businesses. In 1986, the Port Authority of New York and New Jersey sponsored a conference entitled *Italy's Industrial Renaissance: A Strategy for Developing Small Manufacturing Business*. It brought together researchers, businessmen and public policy officials from New York State, the New York Metropolitan Region and the Emilia-Romagna region of Italy to explore the Emilia-Romagna model for generating small manufacturing firms to replace employment lost in the downsizing of mass production industry in the area. Small firms in the Emilia-Romagna region have been provided with a broad spectrum of centralized business services as a result of close cooperation between the regional government and business and labor groups. This model may be applicable to Long Island.<sup>10</sup>

Emilia-Romagna is one of twenty regions that comprise the Republic of Italy. The economy of the area is dominated by small manufacturing firms which account for about 90,000 of the 325,000 registered firms in the area. Principal industries include metalworking, ceramic tiles, knitwear and dresses, food processing and machinery. Per capita income in the area is the highest in Italy. Much of the region's economic success can be attributed to its thriving small manufacturing businesses. There has been a conscious public-private effort to support smaller industries in the region. This has taken the form of policies designed to reduce their disadvantages relative to large firms, disadvantages such as lack of technical information or problems with marketing, export relations or access to credit.

**The Confederazione Nazionale dell'Artigianato (CNA).** A variety of centralized services are provided to the area's small businesses. CNA, the largest small firm association in the area, handles general accounting for 44,000 of its member firms and prepares the payrolls for another 16,000. More than 110,000 small employers file their tax returns through CNA. CNA also organizes technical and management courses through its regional training centers, represents member firms at trade fairs and exhibitions and helps establish cooperatives to solve problems such as bulk purchasing, product and process design, marketing and pollution control. If asked to do so by groups of small firms, CNA will also acquire land and construct factory buildings. CNA organizes specialized *guarantee cooperatives* through which groups of small firms can gain access to bank financing at competitive rates. CNA packages group insurance covering all risks for their membership. It assists in planning and financing new enterprises and provides consulting services to new entrepreneurs in the first years of activity. CNA actively trains new entrepreneurs from the ranks of dislocated workers, technicians with ideas for new products or processes and young people who want to go into business for themselves. CNA helps with the legal work and licensing procedures in setting up a new firm. CNA also negotiates labor contracts with the trade unions. Basic membership in CNA is \$100 annually plus one percent of total wages paid. Additional services are provided at cost.

<sup>9</sup>Long Island High Technology Profile, P. 9.

<sup>10</sup>See *Italy's Industrial Renaissance: A Strategy for Developing Small Manufacturing Business*. Proceedings from a conference held October 21-22, 1986, One World Trade Center, New York City.



**Regional Service Centers.** ERVET, a public-private partnership created by the regional government with the support of banks and industrial associations, has created a network of industry-specific service centers. These centers introduce new technologies and management methods to small businesses. There are currently technology transfer service centers and marketing service centers targeted to the knitwear industry, the agricultural machinery industry, the shoe industry, the construction industry and the metal-working industry. The centers serve firms of all sizes but services are only available to member companies. Initially, the centers are partially supported by public funding. However, operating costs are ultimately met by member firms which pay annual dues equivalent to a percentage of their gross earnings. The service centers are supported by a *technology observatory* which performs research and draws upon the technical capabilities of local universities.

**Economic Development Efforts of the Regional Government.** The regional government is continually involved with business groups and trade unions. Its economic development activities include providing information on export markets and supporting trade fairs, giving business firms grants and low-cost loans for introducing new technologies and providing training for workers and managers. The regional government also supports and helps to organize the regional service centers.

**Economic Development Efforts of Local Universities** Local universities also play a role in the support of small manufacturing firms. The University of Bologna has a ceramics center as part of its Faculty of Engineering. The center carries out applied research on materials. Its first ten years coincided with the rapid development of the ceramic tile industry in the area. Also under study is a Regional Technology Center, which would provide basic and applied research assistance to the area's manufacturers.

**Attitude Toward the Workforce.** The labor force in the Emilia-Romagna region is viewed as a key resource. Workers are flexible and can operate most of the machinery on a given shop floor. Economic growth in the region is based not on low wages but on constant improvements in productivity engendered by the introduction of modern machinery and advanced management techniques.

The Emilia-Romagna program was implemented to take up the slack caused by the downsizing of mass production industry in the area. The parallel on Long Island may be the gradual downsizing of Long Island's large defense firms in response to the changing needs of the Defense Department and the changing competitive climate within the industry. It seems likely that Long Island can draw upon the experiences of the Emilia-Romagna region of Italy to restructure its industrial base and enhance the competitiveness of its small manufacturing firms. The centralized services provided by CNA seem particularly applicable to the needs of Long Island's emerging high-technology firms. Centralized financial, technical and management services can be provided to such firms on a limited scale in planned incubator facilities. However, an areawide association of small firms, similar to the CNA, can provide needed services on a much broader scale. Industry-specific service centers targeted to Long Island's high-technology growth industries, such as bioengineering, should also be considered.

It seems clear that in order to prosper, small firms, particularly those utilizing evolving technologies, need a broad spectrum of low cost, readily available, financial, technical and managerial services. Given the plethora of public and private economic development agencies on Long Island, it is likely that the means to provide these services in an efficient and cost-effective manner can be found.

## DEVELOPING BUSINESS - EDUCATION PARTNERSHIPS

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One of the challenges confronting policymakers is to ensure that the skills of Long Island's resident labor force satisfy the skill needs of current and potential employers. The volume of technical knowledge required by industry is doubling every fifteen years. Educators can respond most effectively to the changing knowledge requirements of the workplace if the business community is actively involved with local schools.

**Primary and Secondary Schools.** Good primary and secondary schools provide a solid base for business activity. A number of innovative and successful business-education partnerships involving primary and secondary schools currently exist.



In Rochester, New York, several major Rochester businesses and the University of Rochester established a Business/Education Task Force to address the problems of dropouts, truancy, low achievement and a lack of employment skills among the city's youth. Their work led to the establishment of the Rochester Brainpower Program. The program provides job opportunities as an incentive for better student performance; opportunities for increased interaction among businesses, students, teachers and school administrators; and, opportunities for teachers, guidance counselors and administrators to enhance their teaching and management skills. It also gives the city's schools access to the private sector's problem-solving capabilities in non-instructional areas. Nearly thirty business-education partnerships have been generated by the program. One of the city's largest law firms formed a partnership project with the city's *magnet school* for law and government. Partnerships have also been formed with Eastman Kodak Company, Xerox Corporation, Marine Midland Bank, Rochester Gas and Electric, Rochester Telephone Corporation and Rochester Community Savings Bank.

A private sector co-operative program, formed by a partnership between the Rochester City School District, Rochester Jobs, Inc. and several local businesses, utilizes Job Training Partnership Act funding to help disadvantaged high school juniors and seniors find part-time jobs. Under the program, students work a half-day and attend classes the other half. Jobs are intended to provide training in the student's field of interest. The program allows students to learn job skills and earn a paycheck. It is hoped that this will motivate some students to remain in school.

The Rochester Area Career Education Council provides summer internships for area teachers. These jobs may relate directly to the teacher's subject area or be of a more general nature. The internships provide teachers with a better understanding of what the business does, what kind of career opportunities it offers and what a student must do to prepare for a job with that company.

The PRIS<sup>2</sup>M program, Program for Rochester to Interest Students in Science and Math, draws successful minority-group engineers from local businesses to act as personal counselors, assist teachers in the classroom, conduct summer workshops, and serve as group tutors. Students also receive assistance in preparing for

college. The goal of the program is to establish greater representation of minority students in engineering colleges. It is funded by the Rochester Industrial Management Council and the local business community.

In New York City, the New York City Partnership was formed to increase the business community's involvement in the City's long-term economic growth. The Partnership's Education Committee oversees a broad program to improve elementary and secondary education. Businesses work with individual New York City schools to provide technical assistance, classroom speakers, mentors, part-time jobs and on-the-job training, scholarships, equipment, teacher training and curriculum development. The Committee also analyzes city, state and federal legislation affecting the schools, lobbies for greater support of public education and makes management assistance available to city schools. For example, the Committee is assisting with a study of security in the city's elementary schools and with a review of the school system's capital plant.<sup>11</sup>

A high quality primary and secondary educational system is a vital part of the infrastructure of any region that seeks to remain competitive in a technological world. Long Island has some of the finest systems of primary and secondary education in the nation. However, if Long Island firms are to continue to compete successfully in national and international markets, they must align themselves more closely with the local schools that are training their future workforce. For example, a closer dialogue between Long Island high-technology firms and local high school math and science teachers and students could be the catalyst for developing more relevant math and science curriculums and for stimulating student interest in the scientific disciplines. It is also necessary to emphasize the study of foreign languages in the early grades. Greater familiarity with foreign languages will become increasingly necessary as the U.S. economy becomes more closely integrated with the global economy.

<sup>11</sup>For a listing of business-education partnerships see The Public Policy Institute, *Partnerships For the Future: Business-Education Partnerships in New York State*, Albany, N.Y., October, 1987.



**Institutions of Higher Education.** Long Island's high-technology industries are footloose in the sense that they are not tied to raw materials or other natural resources. Their primary resource is *brainpower*. Long Island colleges, universities and vocational schools have an obvious role to play in generating that brainpower. Effective education in the liberal arts, math, science, technology and languages is part of the process. However, Long Island colleges and universities can perform a function well beyond their training role. Today, the business community is seeking new ideas to enhance its long-term competitiveness. At the same time, universities require the assistance of the business community to maintain their research infrastructure in the wake of declining enrollments and rising research costs. The growing bond between universities and industry reflects the fact that in today's economic climate, knowledge has become a critical economic resource.

There are numerous opportunities for closer industry-university cooperation on Long Island. Joint university-industry research projects are one element of the partnership. On-campus incubator facilities and adjacent research parks help to facilitate such joint projects. The distinguishing features of such facilities are their many small tenants, their shared services, and the assistance provided by the university in terms of planning, marketing, technology and patents. Shared facilities and services are particularly useful to fledgling operations with limited capital.

A number of successful research parks are currently in operation. They include the Research Triangle Park, a 6,200-acre office and research park located adjacent to Duke University, the University of North Carolina at Chapel Hill and North Carolina State University, Stanford University's research park, Princeton's Forrestal Center and New Haven Science Park, an affiliate of Yale University. Such facilities not only help emerging industries but also generate income for the university.

Other forms of industry-university cooperation have been effective in the Boston area and could be adapted to Long Island's needs. These include programs like M.I.T.'s Enterprise Forum, which is jointly operated by the M.I.T. Alumni Association and by prominent individuals within the Massachusetts high-technology community. Its directors include management professors, venture capitalists and entrepreneurs. The Forum sponsors monthly case presenta-

tions by young entrepreneurial firms seeking advice, contacts and venture capital. The Forum has helped to build a high-technology network and has helped to create an entrepreneurial, risk-taking environment that encourages new startups.

Entrepreneurship courses that provide *hands on* instruction on how to start a business and write a business plan are also useful. Long Island universities can also provide an *idea bank* data base containing rosters of student and faculty scientists and engineers, their on-going research projects and their employment interests. The roster could be cross-referenced with a parallel data file containing proposed and on-going industry-sponsored research projects as well as industry requirements in terms of scientific, engineering and technical manpower. Universities can also maintain a data base listing university resources available for joint projects with industry. These resources might include public domain software, computer equipment, laboratory facilities and space. Firms could be charged a modest fee for access to these computerized files.

Long Island universities might also consider establishing high technology advisory panels composed of university administrators, executives of high technology firms and venture capitalists. Panels could address such matters as continuing education programs, joint research and development projects, industry donations of funds and equipment to the university and guidelines for faculty consulting and entrepreneurship. Such panels would be a signal to university faculty members that the university is serious about cooperating with industry and that faculty members will be recognized for their practical problem-solving efforts as well as for publishing in scholarly journals.

Another form of industry-university cooperation is the contract teaching of specific university courses. For example, engineers employed by Long Island aerospace firms could teach, on a contract basis, those courses that are particularly relevant to the needs of the university and the participating firm. This mechanism is especially suited to those technical disciplines in which universities cannot compete with private industry for faculty members. Universities could also *lend* selected graduate students to private industry for specific projects. Students would spend part of the academic year at the university and the remainder in industry and would receive academic credit for their work in industry.



Closer industry-university cooperation would assure a better *match* between labor force skills supplied and demanded in the bi-county area. It would also lead to more effective commercialization of the new ideas and techniques that are being generated within Long Island's university community.

## ENHANCING OUTPLACEMENT EFFORTS

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Long Island aerospace manufacturers face real declines in defense spending and a shifting mix of Defense Department procurement needs. For example, there will be less emphasis on airframe production and more stress on the design and production of sophisticated electronic components and devices. Therefore, some future layoffs are inevitable. Conceivably, a given firm may be discharging production workers, while at the same time seeking engineers and others with specialized skills.

The economic plight of displaced workers can be mitigated by well-planned outplacement programs. A number of effective programs in this area currently exist both on Long Island and nationally.

**Program of the Suffolk County Labor Department.** On Long Island, the Suffolk County Labor Department has worked closely with labor and management at the Fairchild Republic Company to assist employees affected by the closure of the firm's Farmingdale facility. Their model is also applicable to situations involving more limited layoffs. The Department has helped to sponsor several job fairs and is currently administering a Job Training Partnership Act (JTPA) special re-employment assistance grant totaling \$1 million. The grant will ultimately provide services for 505 former Fairchild workers. These services include on-the-job training, relocation financial assistance, classroom re-training, employability workshops, assessment and counseling, and testing and in-depth assessment.

The first job fair, held in May, 1987, was sponsored by the Suffolk Department of Labor, the Towns of Hempstead and Oyster Bay, the management of Fairchild Republic and Republic Lodge No. 1987 of the International Association of Machinists and Aerospace Workers. More than 800 Fairchild workers and over 125 companies

attended. A second fair was held in September, 1987. Some 600 employees and 80 employers attended. Both job fairs were held on the premises of the Fairchild-Republic Farmingdale, New York facility. Space was made available not only to employers but also to vocational training schools, employment agencies, the armed services and government.

**Responses of Other Communities to Plant Closures.** Long Island can also draw upon the successful responses of other communities to plant closures and layoffs. One useful model is the Ford Motor Company's response to the 1983 closing of its San Jose, California assembly plant which displaced nearly 2,400 workers. Although Long Island is not likely to be confronted with such mass layoffs, the procedures used can nevertheless be adapted in a more limited way to a situation involving small or gradual layoffs.

Ford gave six months advance notice of the closing, made company personnel and facilities available for an extended period of time and made available a broad range of readjustment services. When the closing was announced, an eight-member local Employee Development and Training Program (EDTP) Committee, comprised of company and union representatives, established an Employment and Retraining Center (ERC) within the plant. The ERC remained open until sixteen months after the plant closing. The Company also provided space at the plant for public agencies such as the California Employment Development Department.

The services of the ERC included orientation and benefits, assessment and testing, personal counseling, adult basic education, vocational exploration courses, in-plant seminars and programs, and targeted vocational training. Orientation meetings were held on company time to tell workers what was happening and what services and benefits were available. Personalized information describing each worker's benefit situation at the time of shutdown was distributed. Those who wanted to participate in remedial education and vocational training programs were tested to determine their specific needs. A drug and alcohol abuse counselor was available. The City of Milpitas, in which the plant was located, provided adult education courses in basic math, reading and English-as-a-second language. Vocational exploration courses were offered to help workers decide about the training they wanted. Special seminars, including a financial counseling and a loan seminar, were conducted at the plant by outside experts.



Outside course providers were invited to submit proposals for targeted classroom vocational training and the proposals were evaluated against actual occupational demand in the job market. The contracts with outside providers were performance-based and specified that course providers must place 80% of the trainees in jobs in order to receive full payment. These courses were funded by the United Auto Workers, Ford, Title III of the Job Training Partnership Act, the Trade Adjustment Act and the California Department of Vocational Education.

This cooperative labor-management approach had several positive by-products. Worker participation rates in assessment and testing, basic education, remedial training and job search were unusually high. Approximately 61% of the plant's workers were reemployed and an additional 22% retired. Of those who were reemployed, 85% had participated in the readjustment program. Those who participated in the substantive education and training programs also received higher wages in their new jobs than those who did not: \$10.36 hourly vs. \$8.26 hourly.

Also applicable to the Long Island situation was the response to the massive layoffs at Rockwell's B-1B Division. When it became obvious that significant layoffs would result from the phasing out of the B-1B program, Rockwell and the California Employment Development Department established an outplacement center at the Rockwell plant. EDD representatives assisted employees in applying for unemployment insurance benefits and counseled them in writing resumes and conducting job interviews. Thereafter, community leaders, under the sponsorship of the local board of trade, organized a Job Transition Task Force Committee to coordinate efforts to help displaced workers. Officials from the Economic Development Department, Department of Defense, Department of Labor and southern California aerospace companies served on the task force. Displaced employees were referred to distant aerospace firms that needed their skills. The outplacement center also provided workers with typewriters, phones for inquiries to out-of-state companies and help with typing resumes. Job fairs were also used to bring together displaced employees and prospective employers. Once again, this coordinated approach worked. As of March, 1988, the average laid-off worker at the plant received more than two job interviews and there were a total of 7,230 referrals for interviews.

## REDIRECTING TRAINING and RETRAINING EFFORTS

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Long Island is also richly endowed with the educational resources needed to retrain displaced aerospace workers. There are currently 30 degree-granting post-secondary institutions on 44 campuses in Nassau-Suffolk. Many have on-going programs of vocational, technical and continuing education. A partial listing of these programs follows:

**Hofstra University** Hofstra's College for Continuing Education has an Office of Corporate Training that provides courses designed to upgrade employee skills. The office runs an outplacement counseling workshop. It also offers courses leading to a certificate in government contracting. Hofstra offers a Professional Managers Certificate Program, which is a one-semester program for supervisors and managers of functional and technical departments. The University offers courses for college graduates who want to retrain as computer scientists. In one intensive year of evening studies, students can acquire the equivalent of an undergraduate major in computer science. The Center for Business Study at Hofstra offers courses designed to fulfill New York State licensing requirements in the insurance field.

**Suffolk Community College.** In 1985, the College opened a *Technicenter* in the Hauppauge Industrial Park. The Center trains employees sent by their companies in situations where a skill upgrading is needed. The Center has an electronics laboratory, a heating and air conditioning laboratory, a computer laboratory and a photography laboratory. In 1987, the Technicenter trained 2,400 students in 171 different courses for 100 companies.

**State University of New York at Stony Brook.** Stony Brook's Center for Continuing Education offers courses in labor/management studies, industrial management, public affairs, health care administration, computer science and environmental studies. The University also offers a series of management seminars for the local business community. Courses include: increasing supervisory effectiveness, construction and project management, fundamentals of purchasing and international trade.



**State University of New York at Farmingdale.** Farmingdale's Division of Continuing Education offers part-time evening programs in office management, electrical technology, manufacturing technology, computer science and business administration. The College's Center for Management Development also runs seminars on warehouse management, computer technology, quality control, sales and marketing.

**New York Institute of Technology.** The New York Institute of Technology has a continuing education program for Certified Public Accountants and a license preparatory program for professional engineers. There are also certificate programs in culinary arts, paralegal studies, interior design, travel and tourism, fashion retailing and merchandising and real estate.

**C.W. Post Campus, Long Island University.** C.W. Post's Office of Continuing Education offers certificate programs in accounting, paralegal studies, interior design, real estate, security administration, alcoholism counseling, insurance, mainframe programming, word processing, travel and tourism. A program in financial planning makes students eligible to become certified financial planners. C.W. Post's Real Estate Institute prepares students to become licensed brokers and salespersons. The University also offers approved courses for the New York State insurance licensing examination.

**Brooklyn Polytechnic University at Farmingdale.** Polytechnic University's Center for Advanced Technology in Telecommunications offers a two-year Master of Science in Telecommunications Management to train managers for highly technical environments. The Center's Master of Science Degree in Information Systems Engineering provides training in electrical engineering, computer science, social science and management. The program provides a *bridge* between computer and telecommunications technologies. Both programs have advisory boards from the corporate community to ensure that the curriculum meets the needs of working professionals.

**Dowling College.** Dowling College has programs leading to the Bachelor of Science degree in aeronautics, in aeronautics and management, and in aeronautics and applied mathematics. These programs prepare students for entry into business aviation, general

aviation, airlines, military aviation, and other areas in the spectrum of air transportation, aviation and aerospace. Dowling also has a cooperative education program with the Federal Aviation Administration that prepares participating students to be air traffic controllers.

A number of courses offered at Nassau and Suffolk County high schools also offer some potential for retraining displaced Long Island aerospace workers. For example, courses are offered in electronics and related fields, auto mechanics and repair, small engine and appliance repair, drafting and printing trades, computers, and machine and metal trades.

**Electronics and Related Courses.** Long Island high schools offer courses in electronics, industrial electronics, digital electronics, audio electronics, technical electronics and electricity. The electronics course offers students with some background in electrical theory an opportunity to explore solid state electronics. The most advanced electronics courses enable students to build and experiment with integrated circuits, solid state devices, phase lock loop circuits, tone encoding and decoding circuits and to repair and modify electronic devices including television receivers, transmitters, amplifiers and computers. The construction electricity course teaches students to install, troubleshoot and repair electrical wiring systems, motors, generators and their control equipment.

**Auto Mechanics and Repair.** The course on auto mechanics teaches students to maintain and service automobiles. Students study lubrication, cooling systems, brakes, electrical systems, engines, transmissions, differentials, chassis, wheel alignment, and front end work. Students learn to locate troubles through careful diagnosis and to perform necessary repairs using the newest electronic diagnostic equipment such as ignition scopes, engine dynamometers, timing lights, vacuum pumps and welding equipment. Auto body courses expose students to the materials and processes involved in body work. Emphasis is placed on dent removal, rust repair and painting. The course also teaches paint finishing, glass replacing, aligning frames and strengthening unitized bodies. The diesel mechanics course teaches students to maintain, repair, troubleshoot, disassemble and install diesel engines.



**Table 10.2**  
**Long Island Colleges and Universities**  
**by Undergraduate and Graduate Enrollment**  
**1986-87 Academic Year**

	<b>No. of</b>	
	<b>Under-</b>	<b>Graduate</b>
	<b>graduate</b>	<b>Students</b>
	<b>Students</b>	<b>Students</b>
<b>Four Year Schools</b>		
1 SUNY at Stony Brook	11,200	4,900
2 Long Island University (Greenvale, Brentwood, Southampton)	7,300	4,350
3 Hofstra University	8,189	3,744
4 Adelphi University	5,396	5,104
5 New York Institute of Technology (Old Westbury/ Central Islip)	8,045	1,424
6 SUNY at Old Westbury	3,624	---
7 Molloy College	1,472	---
8 NY Chiropractic College	700	---
9 U.S. Merchant Marine Academy	926	---
10 Dowling College	2,523	540
11 Polytechnic University, Farmingdale	657	805
12 St. Joseph's College	1,470	---
13 SUNY, Empire State College	585	---
14 Friends World College	550	---
15 Webb Institute of Naval Architecture	87	---
<b>Two Year Schools</b>		
1 Nassau Community College	19,363	---
2 Suffolk Community College	17,629	---
3 SUNY at Farmingdale	11,747	---
4 Five Towns College	393	---

**Small Engine and Appliance Repair.** Courses in small engine repair teach the student how to disassemble and repair small gasoline engines of the type used on lawn mowers, snowmobiles, mopeds, motorcycles and gasoline engines. Courses in computer repair teach students fundamental concepts related to computer hardware and repair.

## High Schools That Offer

### Electronics Courses

<b>Nassau County</b>	<b>Suffolk County</b>
East Meadow	Babylon*
Freeport	Bay Shore*
Great Neck North	Connetquot*
Locust Valley	Deer Park
Malverne*	Greenport
Mineola	Hauppauge*
Oceanside	Huntington*
Plainedge*	Huntington Station
Plainview-Old Bethpage	Kings Park*
Port Washington	Northport
Rockville Centre*	Patchogue-Medford
Valley Stream	Sachem
	Smithtown West*
	Ward Melville
	Wyandanch*

### Construction Electricity Courses

<b>Nassau County</b>	<b>Suffolk County</b>
Amityville*	Babylon*
Garden City*	Deer Park*
Malverne*	Greenlawn*
Mineola*	Huntington*
Old Westbury*	Kings Park*
Plainedge*	Middle Country
Plainview-Old Bethpage*	Northport*
Port Washington*	Smithtown East
West Hempstead*	Smithtown West*
	West Babylon*
	Wyandanch*

\*Through BOCES



### High Schools That Offer:

#### Auto Mechanics Courses

Nassau County	Suffolk County
Amityville*	Babylon*
East Meadow	Bay Shore
Freeport	Center Moriches*
Garden City	Connetquot*
Lawrence*	Deer Park*
Levittown	Hauppauge
Locust Valley	Huntington*
Malverne*	Kings Park*
Mineola*	Lindenhurst*
North Shore*	Northport*
Oceanside*	Patchogue-Medford*
Old Westbury*	Riverhead*
Plainedge*	Sachem*
Rockville Centre*	Smithtown*
Port Washington*	Southampton
Seaford	Ward Melville*
Sewanhaka	West Babylon*
Valley Stream	Wyandanch*
Westbury*	
West Hempstead*	

#### Auto Body Courses

Nassau County	Suffolk County
Lawrence*	Babylon*
Levittown	Bay Shore*
Malverne*	East Hampton**
North Shore*	Greenlawn*
Oceanside*	Greenport
Plainview-Old Bethpage	Hauppauge*
Rockville Centre*	Huntington*
Westbury*	Kings Park*
West Hempstead*	Lindenhurst*
	Middle Country*
	Patchogue-Medford*
	Riverhead*
	Sachem*
	Smithtown East
	Smithtown West*
	Southampton
	Ward Melville
	West Babylon*
	Wyandanch*

### High Schools That Offer:

#### Small Engine Repair Courses

Nassau County	Suffolk County
Great Neck North	Deer Park*
Lawrence*	Greenport
Mineola	Hauppauge
North Shore	Patchogue-Medford
Oceanside*	Smithtown
Rockville Centre	
Seaford	
West Hempstead*	

#### Computer Repair Courses

Nassau County	Suffolk County
East Meadow	Bay Shore*
Garden City*	Center Moriches*
Malverne*	Connetquot*
Mineola*	Hauppauge*
North Shore*	Middle Country*
Old Westbury*	Patchogue-Medford*
Plainedge*	Sachem*
Plainview-Old Bethpage*	Ward Melville
Port Washington*	
West Hempstead*	

\*Through BOCES

\*\*Through Ward Tech



**Drafting and Printing Trades.** Long Island high schools offer courses in drafting or industrial drafting. The courses provide the basic skills needed for technical, electrical or architectural drafting. Students learn to interpret drawings and develop skills in sketching, lettering, orthographic projection, isometric drawings, auxiliary and sectional views and the use of drafting instruments. Courses in architectural drawing deal with the planning, design and construction of small homes. Students learn to draw floor plans and building elevations, to read blueprints and to understand the principles of modern architecture. Long Island high schools also offer courses in mechanical drawing, computer assisted drafting, commercial printing, lithography and technical drawing and illustration. The lithography course gives students experience with graphic design, copy preparation, paste-up work, camera and darkroom operations and color separation techniques.

**Computers.** Long Island high schools offer courses in BASIC, FORTRAN, COBOL and PASCAL programming. In addition, courses in business computer applications teach word processing, database and spreadsheet analysis and graphics applications.

**Machine and Metal Trades.** Several Long Island high schools offer welding courses in which students learn electric, gas and arc welding as well as flame cutting for pipe welding, ornamental iron work and metal fabrication. Metalworking courses introduce students to basic skills in the areas of bench and wrought iron metals, sheet metals, arc welding, gas welding and forging. Other courses include machine shop, in which students learn to operate industrial equipment such as lathes, horizontal and vertical milling machines, surface and cylindrical grinders, cut-off saws and plastic injection molders, and machine design, in which students study the principal types of gears and cams and learn the drawing techniques to describe them.

**Aerospace.** Courses in aerospace technology include topics such as aircraft structure, thermodynamics, aerodynamics, computer-assisted drawing, and aviation electronics. In aircraft maintenance courses students prepare for the Federal Aviation Administration licensing examination as certified airframe or power plant mechanics.

## CONCLUSIONS

### An Action Plan For Economic Growth On Long Island

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It has become clear that the Long Island economy will be required to adjust to some shrinkage in its defense industry base in the immediate future. Long Island possesses many of the resources for effective outplacement and retraining programs that will minimize the economic consequences of future layoffs. The personnel officers of Long Island's largest defense firms already meet informally to exchange information about personnel requirements and possible layoffs. This structure could be formalized and broadened to include relevant government and private-sector economic development officials who are concerned with preserving a strong defense-industry base on Long Island. The myriad of governmental, quasi-governmental and private-sector economic development and *action* groups that currently exist on Long Island can be harnessed to lobby for additional defense funds and to attract firms that need Long Island's unique labor force skills. It should be recognized, however, that government-imposed regulations which raise the cost of doing business on Long Island or which are perceived by the business community as overly restrictive can nullify even the most effective economic development efforts.

This study has attempted to address the question: *How can Long Island best prepare for the modest shrinkage of its defense industry base while enhancing the overall competitiveness of its defense firms?* It is based on the premise that Long Island's defense firms are basically competitive and that they will continue to make significant future contributions to the nation's defense preparedness. It has been suggested that the more relevant questions is: *How can Long Island defense firms best convert to non-defense production?* This question implies that Long Island's defense industry base should be allowed to atrophy and that non-defense production is preferable to defense-driven manufacturing activity.



## High Schools That Offer:

### Drafting, Industrial Drafting Courses

<b>Nassau County</b>	<b>Suffolk County</b>
Amityville*	Babylon*
Freeport	Bay Shore*
Levittown	Brentwood
Old Westbury	Connetquot*
Port Washington	Deer Park*
	Greenlawn*
	Greenport
	Hauppauge*
	Huntington*
	Kings Park
	Middle Country*
	Northport*
	Patchogue-Medford*
	Sachem*
	Ward Melville*
	West Babylon
	Wyandanch

### Architectural Drawing Courses

<b>Nassau County</b>	<b>Suffolk County</b>
Amityville	Babylon
Freeport	Bay Shore
Glen Cove	Brentwood
Great Neck North	Cold Spring Harbor
Malverne	Deer Park
Mineola	Greenlawn
North Shore	Hauppauge
Oceanside	Huntington
Old Westbury	Huntington Station
Plainview-Old Bethpage	Kings Park
Port Washington	Lindenhurst
Seaford	Longwood
Sewanhaka	Middle Country
Valley Stream	Northport
Westbury*	Patchogue-Medford
	Riverhead
	Sachem
	Smithtown
	Southampton
	West Babylon

### Lithography Courses

<b>Nassau County</b>	<b>Suffolk County</b>
Amityville*	Babylon*
Lawrence*	Connetquot*
Levittown	Deer Park*
North Shore*	Greenport*
Oceanside*	Hauppauge*
Westbury*	Huntington*
	Lindenhurst*
	Northport*
	Patchogue-Medford
	Sachem*
	Smithtown East

### Mechanical Drawing Courses

<b>Nassau County</b>	<b>Suffolk County</b>
Garden City	Brentwood
Glen Cove	East Islip
Levittown	Greenlawn
Locust Valley	Hauppauge
Mineola	Huntington
Oceanside	Lindenhurst
Plainedge	Longwood
Plainview-Old Bethpage	Northport
Port Washington	Riverhead
Rockville Centre	Ward Melville
Seaford	
Sewanhaka	
Valley Stream	
Westbury	

\*Through BOCES



A number of studies have shown that economic conversion to non-defense production is a dead-end strategy. Gordon Adams notes: "While the idea of planning and implementing the changeover of a facility from defense production to commercial activity is a good one, it has never happened in the United States despite more than twenty years of local organizing and legislative effort".<sup>12</sup> John Lynch notes that conversion theory "has not resulted in one successful product today in the U.S. or Europe".<sup>13</sup> Conversion implies a movement into new product areas. It often takes many years to acquire the specialized expertise required by the new market sector. Lynch underscores the fact that the industrial plant reuse process requires five or more years for product development, market analyses, plant engineering, new tooling and workforce retraining. Thus, the process of economic conversion to non-defense production has severe practical limitations.

Long Island still possesses unique competitive advantages for defense production in terms of the skills of its current defense industry workforce, the existing investment in defense plant and equipment and the energy of its local community and business leadership. **These resources should not be squandered.**

<sup>12</sup>Gordon Adams, *Conversion: A Dead-End Strategy?* in *Economic Adjustment and Conversion of Defense Industries*, John E. Lynch, ed. (Boulder and London: Westview Press, 1987), P. 219.

<sup>13</sup>Ibid, P. 233

## High Schools That Offer:

### BASIC Programming Courses

Nassau County	Suffolk County
East Meadow	Babylon
Garden City	Bay Shore
Glen Cove	Connetquot
Great Neck North	Greenlawn
Lawrence	Hauppauge
Levittown	Huntington Station
Oceanside	Patchogue-Medford
	Sachem
	Smithtown West
	Ward Melville
	West Babylon

### Business Computer Applications

Nassau County	Suffolk County
Amityville	Babylon
Glen Cove	Connetquot
Great Neck North	Greenlawn
Lawrence	Greenport
Malverne	Huntington Station
Mineola	Northport
North Shore	Patchogue-Medford
Plainedge	Riverhead
Plainview-Old Bethpage	Sachem
Valley Stream	



## High Schools That Offer:

### Welding Courses

Nassau County	Suffolk County
Garden City*	Babylon*
Lawrence*	Bay Shore*
Malverne*	Center Moriches*
Mineola*	Connetquot*
North Shore*	Deer Park*
Oceanside*	Greenlawn*
Old Westbury*	Hauppauge*
Plainedge*	Huntington*
Plainview-Old Bethpage*	Kings Park*
Port Washington*	Lindenhurst*
Rockville Centre*	Middle Country*
Westbury*	Northport*
West Hempstead*	Patchogue-Medford*
	Sachem*
	Smithtown*
	Ward Melville*
	West Babylon*
	Wyandanch*

### Metalworking Courses

Nassau County	Suffolk County
Freeport	Hauppauge
Great Neck North	Patchogue-Medford
Mineola	Smithtown
	Southampton
	West Babylon

### Aerospace Technology Courses

Nassau County	Suffolk County
Mineola*	Babylon
Plainedge*	Kings Park
Seaford	Longwood
	Northport
	Patchogue-Medford
	Sachem
	Smithtown

### Aircraft Maintenance Courses

Nassau County	Suffolk County
Amityville*	Babylon*
Garden City*	Bay Shore*
Lawrence*	Center Moriches*
Malverne*	Connetquot*
Mineola*	Greenlawn*
North Shore*	Huntington*
Oceanside*	Kings Park*
Old Westbury*	Lindenhurst*
Plainedge*	Northport*
Plainview-Old Bethpage*	Smithtown*
Port Washington*	Ward Melville
Rockville Centre*	West Babylon*
Westbury*	Wyandanch*
West Hempstead*	

\*Through BOCES



